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COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW
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BRADLEY (R. H. E.). **Studies of the mechanism of transmission of Potato virus Y by the green Peach aphid, Myzus persicae (Sulz.) (Homoptera : Aphidae).**—*Canad. J. Zool.*, 32, pp. 64–73, 1 graph, 1954. [Received February, 1956.]

At the Fredericton Laboratory, Canadian Department of Agriculture [*R.A.M.*, 32, p. 402], the author found that wingless adults of *Myzus persicae*, taken from White Burley tobacco infected with potato virus Y, ceased to be infective usually within minutes and always within 24 hours, the period increasing when they were kept from feeding and also at 2° C. than at 35°. After one to four hours without food over 80 per cent. of the aphids made initial feeding punctures of less than one minute on an infected plant, 70 per cent. of them transmitting the virus. The virus could be acquired in five seconds, but was more likely to be so in from 11 to 60. Insertion of stylets for over one minute decreased the percentage of transmissions, the number reaching zero after 20 minutes' insertion. The percentage of transmitting aphids decreased after ten minutes on infected plants and the chance of a single feeding puncture rendering them infective decreased by about one third during the first ten minutes' feeding after one to four hours' starvation. Even under favourable conditions about 25 per cent. of the aphids failed to transmit the virus, yet in a second trial these same aphids transmitted it readily. The highest percentage transmission was secured when aphids were transferred to test plants immediately after a single brief feeding puncture.

PAUL (H. L.). **Gomphrena globosa als Wirt des Kartoffel-Y-Virus.** [*Gomphrena globosa* as a host of Potato virus Y.]—*NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart*, 8, 1, p. 16, 1956.

The author describes experiments in which tobacco sap infected with potato virus Y [see next abstract] was inoculated by rubbing into leaves of *Gomphrena globosa* [cf. *R.A.M.*, 35, p. 482], sap from which was in turn inoculated into healthy Samsun tobacco plants after a five-day or a four-week interval. From the results he concludes that of the five strains of the virus studied four multiplied in *Gomphrena* without producing symptoms.

NIENHAUS (F.). **Über den Einfluß niedriger und hoher Temperatur auf die Empfänglichkeit der Pflanze für das Kartoffel-Y-Virus.** [On the influence of low and high temperature on the susceptibility of the plant to Potato virus Y.]—*Naturwissenschaften*, 43, 3, pp. 63–64, 1956.

This is a preliminary note on experiments at the Phytopathological Institute, Bonn, Germany, on the influence of temperature on reaction to potato virus Y. The tests were carried out with a Rhineland strain on two- to three-month-old *Physalis floridana* [*R.A.M.*, 35, p. 388 and next abstract] plants held for 48 hours before inoculation at a constant temperature of 4°, 10°, 16°, 21°, 30°, or 36° C.,

a relative humidity of 80 per cent., and under exposure to 4,000 to 5,000 lux from Osram fluorescent tubes. Expressed infectious sap from *Nicotiana glutinosa*, tobacco, and *P. floridana*, diluted 1 in 10 or 1 in 250 with water or phosphate buffer M 100, was used as inoculum.

The plants held at 16°, 21°, and 30° developed the largest number of local lesions (40 to 80 per half leaf at 21°), the incidence at 4°, 10°, and 36° being substantially reduced.

The results of further experiments showed that an admixture with the inoculum of sap from healthy plants of tobacco, *P. floridana*, and Erdgold potato, which had been held for two to eight days previously at 4°, 10°, or 36°, inhibited the activity of the infective component, the influence of lower temperatures being specially marked. The results were not influenced by the ratios of the mixtures of non-infective to infective sap (1:1, 1:2, 1:10, 2:1), the period of operation (10 to 120 minutes), or the use of mixtures from different hosts.

HAMANN (U.). **Der Blattrollvirustest mit Physalis floridana Rydb. unter Verwendung von Zusatzbeleuchtung.** [The leaf roll virus test with *Physalis floridana* Rydb., using supplementary illumination.]—*Züchter*, 26, 1–2, pp. 37–39, 2 figs., 1 graph, 1956.

Under normal greenhouse conditions the use of *Physalis floridana* [see preceding abstract] as test plant for potato leaf roll virus is restricted to the period from March to October, but at the Gross-Lüsewitz Institute for Plant Breeding, German Academy of Agricultural Sciences, Berlin, the use of supplementary illumination (500 watt deep ray, producing a light intensity of 3,600 lux at the level of the leaves) enables it to be used throughout the year. The additional light also accelerates the development of symptoms by five to seven days, while the time required for their complete expression is reduced from between 18 and 33 to a maximum of 12 days. Heat treatment of the foliage prevented the development of clear-cut symptoms.

HOFFERBERT (W.) & ZU PUTLITZ (G.). **Was wissen wir über Veränderungen im Phloem viruskranker Pflanzen, insbesondere blattrollkranker Kartoffeln?** [What do we know about the changes in the phloem in virus-diseased plants, particularly Potato plants with leaf roll?]—*NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart* 8, 2, pp. 20–22, 1956.

The authors review the literature concerning degenerative changes of the phloem in virus-infected plants, with particular reference to the work of Esau [*R.A.M.*, 28, p. 438], and draw attention to the similarity between changes in the primary sieve-tubes of potato plants with leaf roll [35, p. 540], and in the sieve-tubes of the secondary phloem in X-disease of peach and of cherry on Mahaleb stocks [25, p. 37].

WEBB (R. E.). **Wilting, an atypical primary symptom of infection of Potatoes by the leafroll virus.**—*Plant Dis. Reptr*, 40, 1, pp. 15–18, 3 figs., 1956.

At the Horticultural Crops Research Branch, United States Department of Agriculture, wilting (20 days after inoculation) and death (a fortnight later) of potato seedlings of the variety X927–3 infected with the leaf roll virus by *Myzus persicae* or the tuber-plug graft technique [*R.A.M.*, 35, p. 388] was attributed to root starvation caused by severe phloem necrosis in the stem resulting from current season infection at abnormally high temperatures (reaching 96° F. in July). Other potato varieties and seedlings infected with the virus developed typical symptoms. Bacteria and fungi associated with the decaying roots and stems of wilted plants were non-pathogenic to healthy and secondarily leaf roll-infected plants of the seedling variety X927–3. Typical leaf roll symptoms developed after grafting scions from the wilted X927–3 plants to healthy plants of Katahdin in the greenhouse. Similarly the virus was transmitted by *M. persicae* from the wilted plants to healthy *Datura stramonium* plants.

Goossen (H.) & Eue (L.). **Gerätetechnische Probleme der Phytophthora-Bekämpfung.** [Technical problems relating to equipment in *Phytophthora* control.]—*Angew. Bot.*, 30, 3, pp. 80–93, 3 graphs, 4 figs., 1956.

After briefly relating the biology of *Phytophthora infestans* to the current concept that the aim of potato blight spraying is to achieve and maintain a uniform cover of the plants, the authors report investigations at the Plant Protection Centre, Münster, Germany [*R.A.M.*, 34, p. 163], designed to reveal to what extent complete cover is achieved by modern spraying and mist techniques.

Calculations were made of the rate of increase of effective leaf surface during the spraying season. It was found that there is a rapid increase from the middle to the end of June, followed by a falling off to mid-July.

Measurement of the droplet patterns and cover achieved on paper (using coloured spray) and on potato plants by various methods revealed that cover of the lower surface is achieved to a certain extent only in the upper third of the plant. In the lower third, where infection often begins, cover of the lower surface is quite unsatisfactory [33, p. 543].

Studies were made of the action of free water, whether as rain or dew, in redistributing the fungicide (copper) after its deposition. In general, the fungicide was washed from the upper parts of the plant to the lower, and from the centres of the upper leaf surfaces to the edges and tips, so that rain and dew might be said to transport the fungicide to those parts where water persists longest and where infection most readily occurs. It was noted that gentle rain transported the fungicide from the upper to the lower surfaces of the leaves. It is apparent that complete rainfastness, even if attainable, would be a disadvantage for a fungicide to be used against potato blight.

Much work has been done to determine the optimal quantities of copper and water to be used in spraying [33, p. 498]. For a given amount of copper the cover achieved increased with the volume of water used up to 600 l. per ha. but with larger volumes the loss through dripping reduced the protection.

Bochow (H.) & Raeuber (A.). **Untersuchungen über den Einfluß niederer Temperaturen auf den Krautfäuleerreger Phytophthora infestans de By.** [Investigations of the influence of low temperatures on *Phytophthora infestans* de By.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 10, 6, pp. 120–123, 2 graphs, 1956.

At the University of Rostock, Germany, the authors determined the winter survival [cf. *R.A.M.*, 33, p. 492] of biotype 1 of *Phytophthora infestans* in inoculated tubers of the potato varieties Frühmölle and Voran in the field (buried in watertight bags at 10, 20, and 50 cm.) and in cellar storage in 1954–5, and also of biotype D on agar slopes subjected to the same conditions. Sample tubers and slopes were taken for examination every 14 days. Survival of the fungus in the tubers was accepted if luxuriant growth occurred on the quartered tubers after incubation at 18° to 21° C. Survival in slope culture was similarly indicated if at least two tubers inoculated from the culture and kept for ten days at room temperature became infected.

The fungus was markedly inhibited at temperatures below 0° C.; it survived in the tubers only six weeks at a depth of 10 cm. and only one to two weeks at greater depths. Slopes buried at 10 cm. survived longest (nearly four months), viability at other depths being two to three months. The results indicate that under the climatic conditions encountered the fungus probably survives the winter only in clamps or cellars.

Andrén (F.) & Pettersson (S.). **Besprutningsförsök mot Potatisbladmögel 1955.** [Spraying experiments against Potato blight 1955.]—*Växtskyddsnotiser, Stockh., 1956*, 3, pp. 39–44, 1956.

A tabulated survey is given of the data obtained from spraying experiments

against potato blight [*Phytophthora infestans*] carried out in four localities in Sweden, mostly on the Up-to-Date variety, during 1955 [cf. *R.A.M.*, 34, p. 173; 35, pp. 154, 321]. Bordeaux mixture (1·2 per cent.) and the copper oxychloride-containing preparations herusit 50, vitigran, and Ob 21 again proved fully equal in efficiency to the newer fungicides. Provided a rate of application corresponding to a copper content of 3 kg. per ha. was maintained, no significant difference between Bordeaux and copper oxychloride was observed. De Zäta 78 (zineb) [35, p. 780] was somewhat more effective than the other zinc carbamates tested when used at a uniform rate of 2·5 kg. per ha. On the average the lowest net yield of 17,190 kg. per ha. followed two applications of zineb, the corresponding figures for three and four being 18,210 and 20,370 kg., respectively. The yield from plots given an early treatment with zineb and two at the normal times was 18,390 kg., early zineb and two normal copper 18,300, two normal zineb and one normal copper 22,080, and three normal zineb and one normal copper 21,340. Using copper alone at normal times, the yield from two applications was 19,020 kg., from three 20,650, and from four 22,840, while one early and two normal produced 19,030 kg. per ha.

Takakuwa (M.), Takase (N.), & Tomiyama (K.). **The appearance of new races of Phytophthora infestans in Japan.**—*Ann. phytopath. Soc. Japan*, 19, 3–4, pp. 114–116, 1955. [Japanese, with English summary.]

Outbreaks of blight (*Phytophthora infestans*) on Kennebec potatoes at the Foundation Seed Potato Farm, Nagano prefecture, Japan [*R.A.M.*, 30, p. 621], and on resistant hybrids in the field were found to be due to two new races of the pathogen not hitherto recorded in Japan, one attacking only Kennebec and related varieties and the other only the hybrid 48005–83.

Dantas (B.). **A terapêutica das 'sarnas' da Batatinha pelos derivados orgânicos de mercúrio.** [The therapy of Potato 'scabs' by organic mercury derivatives.] —*Circ. Inst. agron. Nordeste, Pernambuco*, 1, 16 pp., 1954. [English summary. Received July, 1956.]

From the results of large-scale experiments conducted at Bahia, Brazil, in 1952 on the disinfection of potato tubers before planting with ethoxyethyl mercuric chloride plus hydroxyethyl mercuric chloride (known commercially as 'clerite'), this appears to be extremely profitable both in cultivated and virgin soils, except in the presence of heavy infestation by *Streptomyces* [*Actinomyces*] *scabies*, *Pellicularia filamentosa* [*Corticium solani*], and *Spondylocladium atrovirens* [*R.A.M.*, 17, p. 57; 26, p. 509]. By the author's formula of minimum increment (*Bol. Agric., Pernambuco*, 18, pp. 218–257, 1951) it was calculated that any increase in yield exceeding 70 kg. per ha., corresponding to 1 per cent. of the production per ha., assured a return of over 20 per cent. on the 'capital invested in that treatment'.

Amann (M.). **Ist neben Colletotrichum atramentarium (B. et Br.) auch Macrophomina phaseoli (Maubl.) am Zustandekommen der 'Gummiknollenwelke' der Kartoffel beteiligt?** [Is *Macrophomina phaseoli* (Maubl.), as well as *Colletotrichum atramentarium* (B. et Br.) concerned in the occurrence of 'rubbery tuber wilt' of Potato?]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, 8, 2, pp. 25–27, 5 figs., 1956.

In this note the author reports preliminary studies on 'Gummiknollenwelke' (rubbery tuber wilt) of potato, a disease which has been present in the Bauland, Taubergrund, and Hohenloher Ebene regions of Baden-Württemberg, Germany, since 1949. The disease is characterized by sudden wilting and drying-out of the haulms immediately after flowering (end of July to mid August). The tubers at harvest are small, soft, and rubbery, and the roots and underground parts of the

haulms are destroyed. Numerous black sclerotia of *Colletotrichum atramentarium* [*R.A.M.*, 35, p. 541] develop at the surface of and below the cortex. Losses vary from year to year, being heaviest in warm, dry years. Entire crops have been destroyed.

In 1953 the author found that in 52 per cent. of the affected plants examined a second fungus was also present, producing dark brown or black, oval or round sclerotia of average dimensions 85·4 by 125·7 μ at the surface of and below the cortex and also throughout the stele in severe cases. The fungus had produced only sclerotia, but had been provisionally identified as *Macrophomina phaseoli* [cf. 32, p. 279]. Attempts to induce the formation of pycnidia were unsuccessful. The cooler, damper conditions of 1954 prevented the appearance of the disease.

Ringröta, ett nytt bekymmer för vår Potatisodling. [Ring rot, a new trouble for our Potato cultivation.]—*Växtskyddsnotiser, Stockh., 1956*, 3, pp. 33–37, 2 figs., 1956.

Although potato ring rot (*Corynebacterium sepedonicum*) [C.M.I. map No. 20] has probably been present in Sweden for at least eight to ten years, it has only recently been recognized as widespread in King Edward plantings, about 100 farms in the southern and central regions being affected. Most important of the legislative measures lately promulgated to prevent the further spread of infection is the unconditional prohibition of the use of diseased tubers as 'seed', while a permit from the Plant Protection Institute is required for the disposal of such material outside the owner's household. A period of two years must elapse before potatoes can again be grown on contaminated soil, while machinery, implements, and store rooms exposed to contact with the pathogen must be disinfected as the Institute may direct.

Akazawa (T.). **Nature of protein synthesis in Sweetpotato infected with Ceratostomella fimbriata.**—*Science*, 123, 3207, pp. 1075–1076, 1956.

Protein analysis at Nagoya University, Anjo, Japan, of healthy sweet potato tissue and sound tissue adjacent to areas affected by *Ceratostomella* [*Ceratocystis*] *fimbriata* [*R.A.M.*, 35, p. 227] suggested that fungal growth may stimulate synthetic activity in such tissues. In slices of sweet potato experimentally inoculated with a spore suspension of *C. fimbriata* increases in the amount of mitochondrial enzymes (functional protein) occurred in the parts adjacent to the infected areas and contributed to the protein recovered. In addition, however, the intrinsic activity of the mitochondria appeared to have increased.

Cook (H. T.). **Sweetpotato diseases.**—*Fmrs' Bull. U.S. Dep. Agric.* 1059, 26 pp., 21 figs., 1955.

This useful account of sweet potato diseases in the United States has again been revised [*R.A.M.*, 23, p. 499].

Reddy (D. P.) & Vaheeduddin (S.). **Dissemination of blast spores.**—*Sci. & Cult.*, 21, 11, p. 675, 1956.

Rice blast (*Piricularia oryzae*) [*R.A.M.*, 34, pp. 517, 772] is a serious disease of rice near the Sewage Farm, Hyderabad, but is as yet restricted to certain areas in the State.

Following the discovery in 1952 that spores of the fungus were not caught in an aeroscope, investigations were begun at the Department of Agriculture, Hyderabad, to determine whether the spores were airborne. At the Sewage Farm, where there were no standing crops, 115 spores were caught on 56 microscope slides coated

on both sides with vaseline and exposed for 24 hours at an interval of one month near paddy haystacks. Slides on the ground trapped an average of 5·8 spores per slide, while others suspended above ground trapped an average of one. More spores were trapped near the infected paddy stacks than in surrounding areas where there were standing paddy crops.

Misawa (T.) & Kato (S.). **Physiology of the causal fungi of stem rot of Rice plant. On the nitrogen metabolism.**—*Ann. phytopath. Soc. Japan*, 19, 3–4, pp. 125–128, 2 graphs, 1955. [Japanese, with English summary.]

Both *Leptosphaeria salvinii* [*R.A.M.*, 35, p. 230] and *Helminthosporium sigmoideum* var. *irregulare* [33, p. 317], the fungi causing stem rot of rice, were able to use ammonium and nitrate nitrogen, urea, and peptone in nutrient solutions at 25° C., but not nitrite. *L. salvinii* grew better than *H.s.* var. *irregulare* with ammonium sulphate and nitrate, the latter fungus doing better with phosphate. Both grew well with nitrogen sources that did not decrease the pH of the nutrient solution, peptone giving the optimum growth. Ammonium nitrogen is absorbed before nitrate nitrogen, the *Helminthosporium* taking up the nitrate earlier than the *Leptosphaeria*.

Atkins (J. G.), Beachell (H. M.), & Crane (L. E.). **Testing and breeding Rice varieties for resistance to the straighthead disease.**—*Rice J.*, 59, 6, pp. 36, 38, 1956.

In field trials for resistance to rice straighthead [*R.A.M.*, 34, p. 747] carried out at Eagle Lake, Texas, with few exceptions selections from two susceptible parents were also susceptible. Among long grain varieties resistance (the highest category on a five-grade-scale) was exhibited by selections deriving their resistance from Fortuna or C.I. 5094; they included Texas Patna (Rexoro × C.I. 5094) and Prelude (Improved Blue Rose × Fortuna). The introduced Caloro and Lacrosse ((Colusa-Blue Rose) × (Shoemed-Fortuna)) showed promise as sources of resistance for short and medium-grain varieties. A resistant reaction was also given by the introduced varieties Asahi and Fortuna, and by Calrose (Caloro × Calady) × Caloro. All the above were more resistant than Bluebonnet, Bluebonnet 50, or Toro.

Pieris (W. I.). **Report on the trial sulphur-dusting of Rubber smallholdings in the Kegalla district in 1955.**—*Quart. Circ. Rubb. Res. Inst. Ceylon*, 31, 3–4, pp. 92–102, 1955.

In 1955 a pilot dusting scheme for the control of leaf fall of *Hevea* rubber due to *Oidium* [*heveae*: *R.A.M.*, 35, p. 391] was operated in the Kegalla district of Ceylon, smallholders being offered treatment at a reduced price. In all, 78 holdings comprising 178 acres received five or six dustings, each at approximately 12 lb. sulphur per acre. The total cost, including supervision, equipment, transport, labour, and miscellaneous items, amounted to R. 48·78 per acre. Very favourable dusting weather prevailed throughout the trial, which lasted 2¼ months.

At the end of the period both leaf fall and serious damage to leaves still on the trees were plainly less on the dusted holdings than on the neighbouring undusted. Many dusted areas had no leaf fall caused by *Oidium*. The effectiveness of the treatment, however, had depended essentially on hard and thorough work and careful supervision, and without these much money might be wasted on ineffectual dusting.

Both the Mistral II A and Noidium machines gave satisfactory results. The Mistral II A was slightly the more expensive, but it was 20 lb. lighter than the other, and the flexible funnel was very useful in assisting the operator to direct the dust while the machine was being carried. The handles could be adjusted to enable two or four men to act as carriers. The Noidium engine was rather more powerful, though the height reached by the Mistral was sufficient for all ordinary purposes.

Strzemska (Mme J.). **Bibliografia polskiej mikrobiologii glebowej lata 1953 i 1954.** [Index of Polish soil microbiology for the years 1953 and 1954.]—*Acta microbiol. polonica*, 4, 4, pp. 289–296, 1955.

This index of publications during 1953 and 1954 covering the microflora and microfauna of the soil in Poland includes 45 titles of papers, some of which have already been noticed in this *Review*.

Payak (M. M.). **On the identity of Sugarcane rust in Hyderabad State.**—*Sci. & Cult.*, 21, 11, pp. 688–689, 1956.

Commenting on a recent paper by Vaheeduddin *et al.* [*R.A.M.*, 35, p. 396], the author points out that Cummins [33, p. 383] has assigned to *Puccinia erianthi* rusts recently described on sugar-cane in India as *P. kuehnii* [30, p. 1] and *P. sacchari* [29, p. 477]. Collections made in India are therefore most likely to be *P. erianthi* [35, p. 749].

Anderson (J.). **Droopy top in Cane.**—*Cane Gr. quart. Bull.*, 29, 4, pp. 146–148, 3 figs., 1956.

Droopy top of sugar-cane [*R.A.M.*, 35, p. 328] in the Innisfield area of Queensland is characterized by the weakness and stunting of the stools, with the trash clinging to the stalk. The leaves, appearing wider and softer than normal, thus confusing recognition of the variety, develop a pronounced striping effect and droop profusely, while the stalk and spindle become rubbery and can easily be bent without snapping. Though the disease is considered to be attributable to a mineral deficiency, so far it is not clear which mineral is involved.

Hylander (N.), Jørstad (I.), & Nannfeldt (J. A.). **Enumeratio Uredinearum Scandinavicarum.** [List of Scandinavian Uredinales.]—*Opera bot.* (*Bot. Notiser Suppl.*), 1, 1, 102 pp., 1953.

This paper is important because the authors attempt to apply to all the rusts of Scandinavia the 1950 Rule that names based only on the uredo state are invalid for transfer to give the name for the perfect state. *Puccinia striiformis*, as suggested in 1951 [*R.A.M.*, 30, p. 602], is now accepted in place of *P. glumarum*. *P. caricina* DC. is used in a broad sense for the *Carex* rusts previously called *P. caricis*, *P. pringsheimiana*, etc. *P. punctiformis* (Str.) Röhl. is preferred to *P. obtegens* (*P. suaveolens*). *Uromyces fallens* is accepted for the rust on red clover.

The authors also continue to use morphology rather than host relations in deciding on names of rusts. Thus, the ten 'species' of *Coleosporium* in Scandinavia are placed under *C. tussilaginis* with nine races; seven *Melampsora* spp. on *Salix* are grouped under *M. epitea*; five on *Populus* under *M. populnea*; *Puccinia porri* is considered a synonym of *P. allii*; and *P. rubigo-vera* [35, p. 596] is used in a wide sense. Among the 'race groups' of *U. pisi* [29, p. 242] are *U. laburni* (commonly called *U. genistae-tinctoriae* [27, p. 462]), *U. onobrychidis*, *U. punctatus*, and *U. striatus*.

After making these reductions there remain 264 recognized species in Scandinavia (Denmark, Finland, Norway, and Sweden).

Lindquist (J. C.). **Las royas parásitas de Caliceráceas.** [The parasitic rusts of the Calyceraceae.]—*Darwiniana, B. Aires*, 11, 1, pp. 9–23, 2 figs., 1955. [Received July, 1956.]

This critically annotated continuation of a previous study on the rusts of the province of Mendoza, Argentina [*R.A.M.*, 33, p. 689], comprises eight species of *Puccinia*, including three new ones, and a new species of *Uredo*, all on members of the Calyceraceae.

MÜHLE (E.). **Rostpilze.** [Rust fungi.]—39 pp., 38 figs., Wittenberg Lutherstadt, A. Ziemsen Verlag, 1956. DM. 2.25.

This booklet comprises a brief outline of the life-history of *Puccinia graminis*, followed by short descriptions of the families of Uredinales, with familiar examples, and a general chapter on control.

MATTERS (C. NAN). **Morphological characters of Trametes cinnabarina (Jacq.) Fr., Polyporus cinnabarinus (Jacq.) Fr. and Polystictus sanguineus (Linn.) Mey. Morphological characters of Polyporus gilvus (Schw.) Fr. and Polyporus scruposus Fr. Morphological characters of six isolates of Coniophora cerebella Pers. Oxidase reactions of ten species of wood-destroying fungi.**—*Progr. Rep. CSIRO For. Prod. Div. Proj. P. 11, Sub-Proj. P. 11–12*, 5, 22 pp., 4 pl., 5 diags.; 6, 10 pp., 2 pl., 5 diags.; 7, 13 pp., 3 pl., 5 diags.; 8, 8 pp., 3 pl., 1955. [Mimeographed.]

The fifth report of this series [*R.A.M.*, 35, p. 126] describes, in similar manner to those preceding it, the characteristics of six isolates of *Trametes cinnabarina* from Australia, four of *Polystictus sanguineus* from various sources outside Australia, and two of *Polyporus cinnabarinus* from Canada. Although these fungi may represent one species [cf. 32, p. 157], it seems that two forms, geographically separated, may be included, differing more in physiological features such as rate of growth and production of red pigment than in the characters of the sporophore. The Canadian isolates of *P. cinnabarinus* grew more slowly than the others and failed almost entirely to develop pigment.

In the sixth report the author describes the cultural characters of *P. gilvus* and *P. scruposus* [cf. 28, p. 361], concluding that the two species are very closely related, if not identical.

The seventh report describes the cultural characters of six isolates of *Coniophora cerebella* [*C. puteana*]. These were divided into two groups, A comprising rapid growers in which strands never formed, or only in old cultures, and B slow growers forming strands in young cultures.

The eighth report is concerned with the oxidase reactions of the fungi described in reports 3 to 7. They mostly fell into two groups, one giving a positive reaction (a brown discoloration) and the other no reaction when grown on 3 per cent. malt extract agar with 0·5 per cent. gallic or tannic acid. The reaction of *P. tumulosus* was inconsistent and the positive reaction of *C. puteana* with gallic acid differed from the result recorded by other workers.

DONK (M. A.). **Notes on resupinate Hymenomycetes—II. The tulasnelloid fungi.** *Reinwardtia*, 3, 3, pp. 363–379, 1956.

Continuing his studies on resupinate Hymenomycetes [*R.A.M.*, 33, p. 564], the author considers there are grounds for separating the fungi with repetitive spores hitherto included in *Botryobasidium* into two new genera, of which *Thanatephorus* is reserved for the parasites with a *Rhizoctonia* state, type species *T. cucumeris* (syn. *Hypochnus cucumeris* Frank and *H.* [*Corticium*] *solani*).

LUTTRELL (E. S.). **The separation of Curvularia trifolii and C. lunata.**—*Plant Dis. Reptr*, 40, 1, pp. 57–60, 1 fig., 1956.

Morphological investigations at Georgia Experiment Station, Experiment, showed that the conidial hilum, protuberant in *Curvularia trifolii* and included within the contour of the rounded basal wall in *C. lunata*, is a constant diagnostic character distinguishing these two species from one another. Using this criterion, the *Curvularia* causing a leaf spot on gladiolus, usually referred to *C. lunata*, is to be regarded as a specialized form of *C. trifolii*, which species is otherwise confined

to clover. The protuberant type of hilum has previously been reported in *C. andropogonis* [*R.A.M.*, 13. p. 475] which can, however, be distinguished from *C. trifolii* by its much larger conidia.

Baldacci (E.) & Grein (A.). **Esame della forma delle spore di attinomiceti al microscopio elettronico e loro valutazione ai fini di una classificazione.** [Examination of the form of the spores of actinomycetes by the electron microscope and their value for the purposes of a classification.] —*G. Microbiol.*, 1, pp. 28–34, 4 pl., 1955. [English summary.]

An electron microscope study conducted at the Institute of Plant Pathology of the University of Milan, Italy, of the spores of some 50 strains of actinomycetes [*R.A.M.*, 34. p. 615; 35. p. 637] showed that they were of three forms: (1) oval, more or less transparent; (2) roundish, not transparent; (3) more or less polyhedral, occasionally transparent.

The strains grouped in the 'series' Diastaticus have oval to slightly polyhedral spores, mostly very transparent, with short, 'thick' spines [cf. 35. p. 237]. The spines were lacking in one species and four strains. The spores of all the strains in the series Griseus displayed great uniformity, all being roundish, smooth, and not transparent. The few strains placed in the 'series' Albus and Lavendulae showed a discrete uniformity, the Albus spores being kidney-shaped, smooth, and hardly transparent. If the appendages (spines, hairs, wrinkles, etc.) are excluded from the concept of form, then the form of the spores appeared to be constant in every strain of a determined series. It is concluded, therefore, that spore form in the Actinomycetes can serve to determine the series but not the species.

Nagata (T.) & Kibushi (H.). **Control effects of some fungicides on the Tea blights and their influences on the qualities of Tea.**—*Bull. Tea Div. Tôkai-Kinki agric. Exp. Sta.* 2, pp. 65–96, 1954. [Japanese, with English summary. Received April, 1956.]

Spraying and dusting experiments to control white spot [unspecified], anthracnose [*Gloeosporium theae-sinensis*: *R.A.M.*, 31. p. 258 and next abstract], and bacterial disease [unspecified: cf. 3. p. 4] were carried out at the Tôkai-Kinki Agricultural Experiment Station, Japan. White spot was controlled by two sprays around 10th April with Bordeaux mixture (0·4 to 0·6 per cent.) or copper-mercurial wettable powders A and B (1 in 320), all of which could be used with parathion. Zineb, SR-406 [captan], phygon, and ziram at 1 in 500 were also effective, and spraying was better than dusting. Anthracnose was controlled by the same fungicides, but the only effective dust was the copper-mercurial. Against the bacterial disease Bordeaux mixture, wettable powder A, and zineb were best. The copper fungicides could be used up to 25 days before plucking without spoiling the flavour of the tea; the others should be applied earlier. Copper fungicides with a sulphur suspension affected flavour if applied after April.

Nagata (T.). **Studies on anthracnose of the Tea plant.**—*Bull. Tea Div. Tôkai-Kinki agric. Exp. Sta.* 2, pp. 97–131, 4 graphs, 1954. [Japanese, with English summary. Received April, 1956.]

The optimum temperature for development of *Gloeosporium theae-sinensis* responsible for anthracnose of tea in Japan [see preceding abstract], was determined as 25° C. Conidia formed on the leaves and dispersed by rain or wind were the main source of inoculum. Potassium deficiency, heavy rain, and hand-plucking all contribute to major outbreaks of the disease, which checks the growth of buds axillary to infected leaves. Introduced tea strains were more resistant than native ones, having a thicker cuticle, more tannin, and an increased production of gallic acid at the point of entry of the pathogen.

Bawden (F. C.) & Pirie (N. W.). **Observations on the anomalous proteins occurring in extracts from plants infected with strains of Tobacco mosaic virus.**—*J. gen. Microbiol.*, 14, 2, pp. 460–477, 1956.

The view that virus infection of plants should be regarded as a change in the protein metabolism of the host cells, leading to a variety of related but non-identical particles, is now becoming more widely accepted [*R.A.M.*, 32, p. 514]. When extracts from plants infected by various strains of tobacco mosaic virus were ultracentrifuged at Rothamsted Experimental Station, the non-infective supernatant fluids still contained 0·5 to 5 per cent. of the proteins serologically related to the viruses. The small, mostly spherical particles aggregated to form short rods as the antigen was purified progressively by precipitation with acid or salts, and long rods were formed after heating in buffer pH 5·5 or incubation with trypsin. As the particles increased in length their serological behaviour in precipitation tests changed from the 'somatic' to the 'flagellar' type. Purified preparations of the unsedimented antigen from plants infected by the type or the *Datura* strain of tobacco mosaic virus contained 0·1 to 0·2 per cent. phosphorus, apparently in the form of ribose nucleic acid. There was no evidence that the preparations were mixtures containing some particles with the 0·5 per cent. phosphorus characteristic of infective virus and some of protein, free from nucleic acid.

The *Datura* strain produced a higher ratio than the others of unsedimented to sedimented antigen. The amount of unsedimented antigen was correlated with the total content of anomalous protein when the protein was increasing rapidly, but later it fluctuated unpredictably. No conditions were encountered that consistently favoured its accumulation, but when plants systemically infected with the type strain were held at 36° [C.] the total amount of antigen decreased, while the amount unsedimented sometimes increased.

In experiments ten years ago one-third of the total antigen obtained as poorly infective nucleo-protein sedimented in the ultracentrifuge but failed to compact into a pellet. In more recent work, with all the host plants and virus strains used, the uncompacted sediment has contained only a minute part of the total antigen, possibly because of a change in the composition of the plants or extracts.

Köhler (E.). **Über eine reversible, durch die Jahreszeit induzierte Virulenzänderung beim Tabak-Rattle-Virus.** [On a seasonal reversible change of virulence in Tobacco rattle virus.]—*NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart*, 8, 6, pp. 93–94, 3 figs., 1956.

Two strains of rattle [potato stem mottle] virus [*R.A.M.*, 35, p. 128], one isolated from *Sonchus arvensis* exhibiting mosaic and the other from tobacco with typical symptoms of 'rattle', were inoculated in summer into young Turkish Samsun tobacco plants under glass at Brunswick. The virus produced systemic infection with clearly defined mosaic, quickly leading to extensive necrosis and browning with deformation of the leaves. Subsequent symptoms were much milder. The author referred to this as 'summer-type' infection.

When subinoculated in the autumn from old into young plants the virus produced quite a different 'autumn-type' infection. It was non-systemic, the internodes remained short, giving the plants a bushy aspect, and the leaves were flecked about the midribs, but unaffected at the margin. In the autumn the plants which had previously exhibited the summer-type infection changed rather suddenly to exhibit the autumn type. Most plants recovered from these symptoms, continuing to grow almost normally. Sap from symptom-free leaves was not infectious. After the winter normal growth continued for the most part, but there were small, scattered, necrotic spots on stems and leaves. Sap from such spotted leaves, inoculated into young tobacco plants, produced autumn-type infection in most of them, but summer-type infection in a few.

The author considers that the change from one infection type to the other results from a reversible change of virulence in the virus. In support of this he quotes a further experiment in which infective sap from *S. arvensis* was inoculated in July into four tobacco plants, all of which developed the autumn-type infection. This he interprets as indicating that the change of virulence which occurs in the virus in tobacco in autumn can also occur in summer in *Sonchus*.

Heggestad (H. E.), Neas (M. O.), & Grosso (J.). **Comparison of various streptomycin dust and spray treatments for wildfire control in Tobacco plant beds.** —*Plant Dis. Reptr*, 40, 1, pp. 48–51, 2 figs., 1956.

Co-operative trials by the Field Crops Research Branch, United States Department of Agriculture, at Beltsville, Maryland, and Tennessee Agricultural Experiment Station at Greeneville showed that spray treatments (5 and 10 gals. per 100 sq. yds.) of 200 p.p.m. streptomycin sulphate were more effective than dust treatments (3 lb.) in controlling wildfire (*Pseudomonas tabacum*) inoculations on tobacco [*R.A.M.*, 34, p. 754], reducing the number of leaves destroyed at Greeneville from 92·1 (no treatment) to 30·2 and 28·9 as against 45·8 (dust) and 77 (tribasic copper sulphate) in the range of 0—no disease to 100—all leaves destroyed. The slight difference in disease reduction between the 5- and 10-gal. rates indicates that only thorough wetting of the leaves with the streptomycin spray is needed to obtain good control. No assessments were made at Beltsville, though the disease control by streptomycin was considered to be better than could be expected by copper treatments.

Geraldson (C. M.). **The use of calcium for control of blossom-end rot of Tomatoes.** —*Proc. Fla hort. Soc.*, 68 (*1955*), pp. 197–202, 1956.

A new method of controlling blossom-end rot of tomatoes, developed at the Gulf Coast Experiment Station, Florida, has proved completely successful in field and greenhouse trials. It is based on the concept that the primary cause of the condition is calcium deficiency [*R.A.M.*, 32, p. 700]. The main objective is to maintain the calcium level in the soil solution at over 20 per cent. of the total soluble salts during the entire growing season. The second objective is to be able to recognize the factors that tend to repress the calcium content during the growing season. Certain practices can accordingly be altered or avoided and further calcium added if required. Supplementary calcium sprays (0·04 M calcium chloride) can be sucessfully utilized when an approaching calcium inadequacy cannot be avoided or corrected by other means.

Koek (P. C.). **Een nieuwe verwelkingsziekte bij Tomaat, Solanum lycopersicum L., veroorzaakt door Pseudomonas solanacearum Smith.** [A new wilt disease of Tomato, *Solanum lycopersicum* L., caused by *Pseudomonas solanacearum* Smith.]—*Versl. PlZiekt. Dienst Wageningen* 127 (*Jaarb. 1954–1955*), pp. 205–208, 3 figs., 1955. [English summary.]

This is a slightly expanded account of the tomato wilt caused by *Pseudomonas solanacearum* in western Holland [*R.A.M.*, 35, p. 494] in the light of 13 contributions to the literature.

Kern (H.). **Möglichkeiten und Grenzen der Bekämpfung von Pflanzenkrankheiten.** [Possibilities and limits in the control of plant diseases.]—Reprinted from *Schweiz. landw. Mh.* (*1955*), 9–10, 7 pp., 1 fig., 1955.

In this general note on plant diseases the author discusses the metabolic mechanisms underlying several wilt diseases caused by toxins, with special reference to tomato wilt (*Fusarium* [*bulbigenum* var.] *lycopersici*) [*R.A.M.*, 35, p. 401 *et passim*].

He anticipates that research will bring to light specific substances which may be introduced into affected plants to counteract wilt toxins.

Spaulding (P.). **Diseases of North American forest trees planted abroad.**—*Agric. Handb. U.S. Dep. Agric.* 100, 144 pp., 1956.

This publication lists (on pp. 4–49) the diseases reported since 1870 as attacking North American forest trees outside the United States [cf. *R.A.M.*, 33, p. 570], with notes on the life-history of the causal organism, the symptoms and general geographical distribution of the disease, and the injury caused. The diseases are arranged in four groups, in which they are listed alphabetically: viruses, by common names; and bacteria, fungi, and mistletoes, by Latin names. Three classes of parasitism are distinguished: (X) causing disease occasionally; (X X) wound parasites; and (X X X) aggressive parasites.

A list is also given (pp. 51–136) of the locations of plantings of these trees abroad that seem likely to be of interest, arranged under the Latin names of the host, and in a further section (pp. 137–144) the places are listed under countries and towns.

Stowell (E. A.). **A study of Entomosporium on Crataegus.**—*Diss. Abstr.*, 16, 2, p. 222, 1956.

The life-history and host-parasite relationships of leaf blight of *Crataegus oxyacantha* caused by *Entomosporium thuemenii* [*R.A.M.*, 28, p. 38] were studied at the University of Wisconsin. In the host tissue the intercellular hyphae of the pathogen produced haustoria which penetrated the epidermis, mesophyll, and vascular bundle cortex. Cruciform macroconidia were formed in subcuticular, mostly epiphyllous acervuli and were capable of immediate germination. The initiation of the perfect state was marked by the formation of stromatic cushions in the spongy mesophyll at the same time as the appearance of microconidia; further development coincided with a growth of saprophytic mycelium at leaf fall. Apothecia matured during May and June under conditions obtaining in Wisconsin. The name *Fabraea thuemenii* sp. nov. is erected [without a Latin diagnosis] for the perfect state of *E. thuemenii*. It was frequently observed that potential ascocarps produced apothecial conidia similar to the *Entomosporium* macroconidia, and they were instrumental in establishing new infections at the beginning of the growing season.

Stillwell (M. A.). **Decay of yellow Birch in Nova Scotia.**—*For. Chron.*, 31, 1, pp. 74–83, 3 graphs, 1 map, 1955.

Of the 374 yellow birch (*Betula lutea*) trees in Nova Scotia examined during 1951–2 to assist forest management, 35 per cent. contained decay [*R.A.M.*, 35, p. 130], the extent of which increased with the age of the trees. About half the trees 120 to 130 years old and all of those 230 years old contained decay. The loss of saleable volume, negligible at 60 years, increased to about 10 per cent. at 240 years. A pathological rotation age of 170 years is suggested for the area. Ten wood destroying fungi were associated with rot in living trees, *Fomes igniarius* [34, p. 681] being the most important of five causing trunk rot and *Poria cocos* [34, p. 115] of five causing butt rot.

Hahn (G. G.) & Eno (H. G.). **Fungus association with Birch 'dieback' and its significance.**—*Plant Dis. Reptr*, 40, 1, pp. 71–79, 1956.

These studies [*R.A.M.*, 35, p. 84] in Maine [34, p. 408] and New Hampshire, carried out by the Forest Insect and Disease Laboratory, Northeastern Forest Experiment Station, New Haven, Connecticut, form a part of the investigations

on excessive mortality of yellow birch (*Betula lutea*) and paper birch (*B. papyrifera*) in the north-east of North America. The fungi isolated from the crowns of deteriorated birches appear to be the same as those reported from Canada [cf. 35, p. 130]. *Cylindrocarpon orthosporum* [34, p. 409; 35, p. 402], the only fungus so frequently isolated from the roots to be regarded as a possible pathogen, did not cause deterioration of healthy saplings in pot experiments with infested soil. A rigorous search for *Phytophthora cinnamomi* [35, p. 336] in Maine birch soils was unrewarded nor was *Armillaria mellea* [34, p. 7] encountered. The mycorrhizal organisms *Mucor ramannianus* [34, p. 181] and *Mycelium radicis nigrostrigosum* [cf. 34, p. 803] were frequently found, but the relationship between die-back and mycorrhiza has not been determined. There is, however, no positive evidence that birch die-back is an infectious disease.

Butin (H.). **Beobachtungen über das vorjährige Aufreten der Dothichiza-Krankheit der Pappel.** [Observations on last year's occurrence of *Dothichiza* disease of Poplar.]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, 8, 4, pp. 55–58, 3 figs., 1956.

The author describes three main types of lesion produced by *Dothichiza populea* on poplar [*R.A.M.*, 33, pp. 568, 695; 35, p. 646]: brown or black oval patches at the bases of side twigs, particularly at the junction of one- and two-year growth; lesions on the main branches where these have been lopped or wounded, particularly in autumn; brown discoloration of the bark round the buds. The last-named are often found on laterals when there are lesions on the main branch. They may, by interference with the transpiration stream or perhaps by the production of toxins, predispose the twigs to infection. If the buds emerge they quickly wilt and die.

The heavy incidence of infection in Germany in the spring of 1955 may be attributable to the poor rainfall following the exceptionally cold weather of February and March [cf. 35, p. 560]. *Populus robusta*, *P. bachelieri*, and *P. vernirubens* are particularly susceptible to the fungus.

Foster (A. A.). **Diseases of the forest nurseries of Georgia.**—*Plant Dis. Reptr.* 40, 1, pp. 69–70, 1956.

This pathological survey of pine seedling nurseries in Georgia shows that of the important diseases fusiform rust (*Cronartium fusiforme*) [*R.A.M.*, 35, p. 250] can be effectively controlled by spraying and that damping-off [32, p. 111] has been virtually absent in recent years, probably because of the use of a sawdust and pine straw cover. Heat injury, characterized by a white-to-tan lesion above the soil line on the south side of the seedling or by chlorosis along the edges of the beds, usually affects seedlings growing through a thick mulch of pine straw or exposed to excessive water or deficient light. A general pale green condition, typical of nitrogen deficiency, is corrected by applying 20 to 40 lb. of nitrogen per acre. Iron deficiency, characterized by irregular, cream coloured patches in the beds, several feet in diameter, is corrected by adding iron chelates to give 3 lb. elemental iron per acre. A residual chlorosis, differing from iron deficiency chlorosis in that yellowing occurs along the edges of the beds only, or on sandy spots in the field, appears suddenly in August and disappears without treatment in October. Its cause is uncertain.

Cone rust (*C. strobilinum*) [19, p. 173], sometimes eliminating more than 60 per cent. of the slash pine (*Pinus elliottii*) cone crop, limits seed production. Practical control is not at present possible.

The economic importance of *Phomopsis juniperovora* on Arizona cypress [*Cupressus arizonica*] is now recognized since the latter is increasingly being used for Christmas trees. Both seed and soil are suspected to be sources of inoculum in the nursery. Selection for resistance may be feasible as many individuals escape

infection. Special semesan (1 lb. per 100 gals.) applied weekly during hot, wet weather gave fair control.

Singh (R. S.). **Root rot and wilt of Sesbania aegyptiaca.**—*Sci. & Cult.*, 21, 11, pp. 680–682, 2 figs., 1956.

In a study of fusarial diseases of legumes at the Government Agricultural College, Kanpur, India, the author discovered a form of *Fusarium oxysporum* specifically pathogenic to *Sesbania aegyptiaca* at all stages of growth but not to any other legume of economic importance locally. The author proposes the name *F. oxysporum* f. *sesbaniae* n. form. for his fungus.

Gibson (I. A. S.). **Trials of fungicides for the control of damping-off in Pine seedlings.**—*E. Afr. agric. J.*, 21, 2, pp. 96–102, 1955; 3, pp. 165–166, 1956.

The results of further experiments similarly carried out at the East African Agriculture and Forestry Research Organization, Muguga, Kenya, on the control of damping-off of *Pinus patula* and *P. radiata* seedlings caused by *Rhizoctonia* [*Corticium*] *solani* and *Pythium ultimum* [*R.A.M.*, 35, p. 730] indicated that of the 11 preparations tested the dithiocarbamates (dithane Z-78 and phelam) were those most likely to give satisfactory control under field conditions, crag 658, though effective, was phytotoxic, perenox was variable, and of the mercurials only leytosol B was satisfactory.

Following these experiments, three sets of field trials were conducted over a wide range of forest stations. In the first, the effect of dithane Z-78 was compared with that of perenox on seedling bed populations of *Pinus patula*. In the second dithane Z-78 was applied either once at sowing as a 1·2 per cent. suspension or weekly as a 0·3 per cent. suspension. In the final series randomized block designs covered eight treatments replicated six times. The 'plots' were based on small seed boxes of plant trays, local soil being used, incorporated where possible with soil from beds in which damping-off had recently occurred. The fungicides (dithane Z-78, perenox, 63 per cent. thiram, phelam, leytosol B, and crag 658) were applied as 0·3 per cent. suspensions at the rate of 1 gal. per 2 sq. yds. weekly until emergence was complete.

No treatment gave the uniform control required for general nursery practice. Effective control by dithane Z-78 seemed to decline with increasing altitude. Other preparations produced erratic results, and many were phytotoxic in certain areas. Further materials are to be tested, but it is unlikely that any one fungicide will prove entirely satisfactory in all the forest nurseries in Kenya.

Gibson (I. A. S.). **Sowing density and damping-off in Pine seedlings.**—*E. Afr. agric. J.*, 21, 3, pp. 183–188, 4 graphs, 1956.

A full account is presented of experiments carried out in Kenya to investigate the relationship between sowing density and damping-off (*Rhizoctonia* [*Corticium*] *solani* [see preceding abstract] in pine seedlings (chiefly *Pinus patula*). The experiments were all conducted in the glasshouse at temperatures between 55° and 95° F. and at relative humidities between 35 per cent. and 85 per cent. *P. patula* seeds were sown in small boxes in local forest soil covered with a uniform amount of soil known to contain *C. solani* and a smaller proportion of *Pythium ultimum*. In some experiments a mixture of an 8- to 10-day-old sand culture of *C. solani* grown on a mixture of 100 gm. sand, 3 gm. maize meal, and 15 ml. water was added, mixed with soil. The experiments were designed to determine (*a*) the relationship between damping-off and sowing density; (*b*) how far variations in soil moisture following increases in sowing density account for increases in damping-off; and (*c*) the importance of soil nutrient. The effect of competition from other members of the soil microflora on the spread of *C. solani* was investigated indirectly, by comparing,

for instance, the amount of disease following the addition of different amounts of fungus inoculum to the soil.

The results obtained consistently demonstrated that the activity of *C. solani* as a damping-off pathogen largely depends on the nutrient available in the soil. Increased losses constantly associated with high rates of sowing were shown to be due to accompanying increases of nutrient rather than to any modification of soil moisture conditions or to changes in the degree of competition encountered by the pathogen. Dead seeds in the soil may act as nutrient sources for *C. solani*, and this finding has a practical application in that seeds of low germination are sometimes sown thickly; if the dead seeds in such batches are not empty shells, the practice increases soil nutriment and the consequent risk of damping-off.

Hord (H. H. V.) & Hildebrand (M. J.). **Armillaria mellea in relation to regeneration of Red Pine, White Pine, and White Spruce.**—*Bi-m. Progr. Rep. Div. For. Biol., Dep. Agric. Can.*, 12, 1, p. 2, 1956.

Observations on young plantings of red pine [*Pinus resinosa*], white pine [*P. strobus*], and spruce in Ontario, Canada, indicated that of the trees dying in the first two years after planting out (177 out of 1,600), 34·5 per cent. were attacked by *Armillaria mellea*, red pine being apparently the most susceptible.

Quirke (D. A.) & Hord (H. H. V.). **A canker and dieback of Balsam Fir in Ontario.**—*Bi-m. Progr. Rep. Div. For. Biol., Dep. Agric. Can.*, 11, 6, p. 2, 1955.

A die-back of balsam fir [*Abies balsamea*] widely distributed in Ontario, Canada [*R.A.M.*, 34, p. 682], is generally confined to single trees or small groups of trees, usually in exposed flat areas, or on south and west slopes, and often on shallow soil, drying out quickly. Initially there is a reddening of the needles on part or all of the tree and a constriction occurs where healthy and affected limbs join. If only one branch is affected an elongate canker forms on the trunk at the base of it. Subsequently fruit bodies of a species of *Nectria* appear on the affected parts, and this may be the causal organism. Dead trees bearing this fungus have also been found attacked by *Armillaria mellea* and other fungi associated have been *Polyporus* [*Polystictus*] *abietinus* [28, p. 498] causing sap rot of affected trees, *Dasyscypha agassizii* [22, p. 412] on affected shoots, and *Adelopus balsamicola* [26, p. 568] on the reddened needles.

Francke-Grosmann (H[elene]). **Zur Übertragung der Nährpilze bei Ambrosiakäfern.** [On the transmission of nutrient fungi in Ambrosia Beetles.]—*Naturwissenschaften*, 43, 12, pp. 286–287, 2 figs., 1956.

Among the ambrosia beetles examined in the course of studies at the Forestry Research Institute, Reinbek, near Hamburg, Germany, on their symbiotic relationships with [unspecified] fungi were *Myelophilus minor* and *Ips acuminatus*, [agents of blue stain of pine sapwood: *R.A.M.*, 33, p. 82].

Etheridge (D. E.) & Carmichael (Elizabeth). **Further observations on the occurrence of Coryne sarcoides (Jacq.) Tul. on Spruce in Alberta.**—*Bi-m. Progr. Rep. Div. For. Biol., Dep. Agric. Can.*, 11, 6, p. 3, 1955.

In this further contribution to the study of *Coryne sarcoides* on spruce in Alberta, Canada [*R.A.M.*, 34, p. 419], the authors observed that the fungus can parasitize living trees without any decay, but then it does not generally stain the wood. The fungus is often found in brown basal rots associated with *Coniophora puteana* [loc. cit.]. As regards its lateral distribution in spruce heartwood, 300 isolations from 12 trees at varying heights showed it to occur only in wood samples containing pith, suggesting that it occurs in the roots as a saprophyte, extending to the basal heartwood, and thence colonizing the pith.

Woeste (Ulrike). **Anatomische Untersuchungen über die Infektionswege einiger Wurzelpilze.** [Anatomical studies on the channels of infection of some root fungi.]—*Phytopath. Z.*, **26**, 3, pp. 225–272, 4 col. pl., 18 figs., 1 diag., 1956.

This comprehensive survey of the author's studies at the Institute of Forest Botany, Munich, Germany, on three important silvicultural pathogens is prefaced by an account of the mode of infection of orchids by mycorrhiza, with special reference to *Spiranthes spiralis* and the work of Burgeff (Die Wurzelpilze der Orchideen, Jena, 1909).

Rosellinia quercina is unable to penetrate the intact cork mantle of the one- to two-year-old oaks to which it is almost exclusively limited, but is dependent on penetrable sites in the root cortex or on wounds. Infection occurs by means of single hyphae which develop rhizomorphs. Penetration is effected mainly through the lenticels, which form a loose aerenchyma under humid conditions, thereby still further facilitating the entry of the fungus, which can also be effected upon the decay of the lateral roots and the root tips before the formation of the protective periderm. Entrance to the interior of the root is gained primarily through the medullary rays, while a considerable extension of the mycelium is also found in the cambial zone. The hyphae are preceded by a toxin which discolours the adjacent tissue. Fructifications are produced in the lenticels.

The investigations on *Fomes annosus* were conducted in a 50-year-old spruce stand [*R.A.M.*, **12**, p. 738; **35**, pp. 231, 732]. Wounds, points of contact, and anatomically preformed organs are by no means indispensable to the entry of this pathogen, although infection proceeds with special rapidity in such areas. The completely suberized cells of the bark are readily traversed after a preliminary weakening by enzymatic action. Infection is established through direct penetration of the walls by single hyphae; in this way innumerable lacunae develop in the peridermal cells, while between individual bark scales the hyphae unite to form an excessively transparent white mycelial membrane. The xylem is reached by way of the medullary rays; the hyphae cause little alteration to the cambium in their passage, disorganization being confined to the heartwood. The fruit bodies are produced not only in the greatly inflated lenticels, but more frequently between the bark scales anywhere on the root surface.

Armillaria mellea [cf. **13**, p. 552], studied in a 60-year-old spruce stand, was found to penetrate the intact surface of the cortex just as easily as through wounds or any specific site. Infection occurs by massive invasion of rhizomorphs [**35**, p. 706], which project into the tissue in the shape of a wedge, preceded by a powerful toxic action. The medullary rays and resin canals are the main routes into the phloem and xylem, entry into which is accompanied by the death and resinification of the cambial zone and phloem. The fruit bodies are formed by the rhizomorpha subterranea, i.e., the organs responsible for infection.

In conclusion, the three factors of equal importance in these root infections are critically discussed in the light of outstanding contributions to the literature, viz., the anatomy of the root, the physiological aptitude of the host for defence, and the virulence of the fungus. The physiological prerequisites of an attack are determined by environmental factors, such as climate and soil consistency.

Walters (N. E. M.). **Herbarium notes on species of Coltricia and Inonotus.**—*Progr. Rep. CSIRO For. Prod. Div. Proj. P. 11, Sub-Proj. P. 11–16*, 1, 20 pp., 6 pl., 1955. [Mimeographed.]

Distinctive characteristics and collection data are given for the fruit bodies, spores, and cultures of seven species of *Coltricia* [*R.A.M.*, **28**, p. 361] and six species of *Inonotus* [loc. cit.] in the herbarium of Australian wood-destroying fungi at Melbourne. Included are *Coltricia laeta* (*Polyporus laetus*), causing a white stringy or pocket rot, with or without black zone lines, on *Nothofagus cunninghami* and

Eucalyptus spp.; *Inonotus* (*Polyporus*) *dryadeus*, causing a white stringy heart rot of *E.* spp.; and *I. nothofagi* [loc. cit.] from white rot on *N. cunninghami*.

FREYSCHUSS (S. K. L.). **A comparative investigation of some methods to protect wet ground pulp against fungal attack.**—*Svensk PappTidn.*, 59, 6, pp. 223–228, 7 figs., 1956. [Swedish and German summaries.]

This is a tabulated report and discussion from the Paper Technology Department, Swedish Forest Products Research Laboratory, Stockholm, of experiments carried out in November, 1954, on the anti-fungal treatment of wet groundwood pulp with 8-hydroxyquinoline (oxin) [*R.A.M.*, 35, p. 734] at the rate of 80 gm. per wet ton alone or combined with pulpasan FF (phenyl mercuric acetate) [cf. 30, p. 427; loc. cit.] at 25 gm.

After nine months' storage at the Aylesford Paper Mills, Maidstone, Kent, the disinfected bales were virtually free from damage, the combined treatment conferring slightly better protection than oxin alone against blueing fungi, e.g., *Pullularia pullulans*. Only traces of the pink to violet discoloration due to *Penicillium cyclopium* were apparent. The protection given by a combination of phenyl mercuric acetate and sodium pentachlorophenate (1,000 gm. per wet ton) did not extend beyond five months and neither gave good results by itself.

Other fungi represented in the untreated or inadequately disinfected bales were *P. roqueforti* [loc. cit.], also causing a pink to violet stain, *Phoma lignicola*, *Phialophora fastigiata*, *Candida* sp., and *Margarinomyces* sp., producing blue to dark spots, and brown rot [of unspecified origin].

MOSSIGE (E. J.). **Saltimpregnering. Nye muligheter for effektiv impregnering av trevirke.** [Salt impregnation. New possibilities for effective impregnation of timber.]—*Norsk Landbr., 1956*, 14, pp. 326–327, 1956.

The Norwegian health authorities having recently accorded permission for the unrestricted sale of chromium and fluorine salts, directions are given in simple language for their use in the impregnation of timber against [unspecified] fungi and insects, e.g., by farmers, nurserymen, and builders. It is estimated that by this easy and economical method of treatment the service life of the wood is extended to between three and five times the normal length.

MARTÍNEZ (J. B.). **El problema de conservación de la madera, necesidad de una intervención estatal en España.** [The problem of timber preservation, requiring State intervention in Spain.]—Conferencia pronunciada el 23 de noviembre de 1954 por el ingeniero de montes, del Instituto Forestal y del Servicio de Plagas Forestales, 38 pp., 10 pl., 2 figs., 1955. [Received 1956.]

The author describes and discusses the various forms of timber decay encountered in Spain (mostly from insects) and current methods of control [*R.A.M.*, 32, p. 290] and prevention employed there and elsewhere. He considers that the importance of the problem demands the establishment of a Technical Commission for Wood Preservation.

SAVARD (J.) & ANDRÉ (A. M.). **A chemical study of the attack on Triplochiton schleroxylon by Poria sp. and by Lentinus nigripes.**—*Publ. Cent. tech. for. trop.* 10, 48 pp., 1956. [French. Abs. in *Bull. Inst. Pap. Chem.*, 26, 9, p. 765, 1956.]

The data resulting from extensive comparative chemical analyses of sound and decayed wood of *Triplochiton schleroxylon* are presented. Rotting by *Poria* sp. involves the selective removal of pentosans and cellulose, whereas lignin increases with the progress of the fungus. There were also increases in the methoxyl content and in solubility in caustic soda. *Lentinus nigripes* reduces all the major components (cellulose, pentosans, and lignin) at roughly the same rate, despite heavy

reductions in weight (up to 67 per cent.). *P.* sp. is the more deleterious of the two fungi, especially from the papermaker's standpoint.

Hickman (C. J.), Schofield (Elizabeth R.), & Taylor (R. E.). **Light leaf spot of Brassicae.**—*Plant Path.*, 4, 4, pp. 129–131, 1 pl., 1955.

In May, 1954, Driancourt cauliflowers grown for seed at Bricklehampton, Worcestershire, were attacked by light leaf spot (*Gloeosporium concentricum*) [*R.A.M.*, 19, p. 449; 29, p. 239]. Later the disease spread from the older to the younger leaves, and towards harvest-time the seed heads and pods became infected. The disease also appeared on adjacent early- and late-planted ware crops of Driancourt, on cauliflower elsewhere in Worcestershire, and on broccoli in Warwickshire and Herefordshire.

The disease occurs generally on the older leaves [15, p. 474]. Both surfaces may be attacked, both on and between the veins. As infection progresses the dull, bleached fawn colour characteristic of the centre of the affected area and particularly noticeable on the upper leaf surface is the symptom most readily recognized in the field.

On the lower (and sometimes the upper) leaf surface the spots later turn black, with a series of concentrically arranged black dots, often surrounded by one or more rings of white dots. Affected areas on the veins and petioles become hard and brown and split longitudinally, and the leaves become distorted.

Apothecia have been formed in culture, but precise identification of the perfect state awaits further studies, which are in progress. The general character of the apothecium and the fact that the asci appear to be inoperculate relate the fungus to the Dermateaceae.

Hull (R.). **Sugar Beet yellows in Great Britain, 1954.**—*Plant Path.*, 4, 4, p. 134, 1955.

In 1954 counts of sugar beets affected by yellows virus [*R.A.M.*, 34, p. 693; 35, p. 585], made by the agricultural staff of the British Sugar Corporation in 150 sample fields in Great Britain, gave 0·15, 2·1, 8·7, and 21·6 per cent. infected plants at the end of June, July, August, and September, respectively, an average of 8·9, while an independent survey of 416,000 acres at the end of August gave an average 8·7. More plants than usual were infected in June, incidence increasing steadily throughout the summer, but too slowly to reduce yields to any great extent. The actual yield of roots was 10·63 tons per acre, as against an estimated potential yield of 11·1 tons.

The worst outbreaks occurred near the coast of Essex and south Suffolk, where 80 per cent. of the plants were yellow in some fields by the end of August, and 100 per cent. by the end of the season. One or two other severe attacks were confined to a few fields near a source of viruliferous aphids. In the Midlands, north Yorkshire, and Scotland there were under 1 per cent. infected plants at the end of August, the figures elsewhere being between 1 and 20.

Myzus persicae was again more plentiful at the end of July on yellowed than on healthy plants, but *Aphis fabae* was not, though both were more numerous at the end of July than at the end of June. Neither species was common on root crops in August and September and consequently few viruliferous alatae moved to steckling beds. All sugar beet steckling beds were certified to have under 1 per cent. infected plants in October.

Roland (G.). **Sur une nouvelle plante-hôte du virus de la jaunisse de la Betterave (Beta virus 4, Roland et Quanjer).** [On a new plant host of Beet yellows virus (*Beta* virus 4, Roland & Quanjer).]—*Parasitica*, 11, 4, pp. 124–125, 1955.

At the State Phytopathological Station, Gembloux, Belgium, yellows virus

[*R.A.M.*, 33, p. 516] was transmitted by *Myzus persicae* from affected forage beet to three of ten *Kochia childsii* plants, healthy aphids fed on these three transmitting the disease to four previously healthy Géante blanche forage beets. Later, of ten Vilmorin rouge forage beets inoculated by means of *M. persicae* taken from two of the infected *K. childsii* plants, two developed vein yellowing followed by symptoms of yellows (interveinal yellowing of old, brittle leaves and gummosis of the phloem).

It is concluded that *K. childsii* can serve as a host of beet yellows virus and, apparently, of a vein yellowing virus, the identity of which has not yet been definitely established [28, p. 202].

Roland (G.). **Un cas de 'ringspot' sur Betterave.** [A case of ring spot on Beet.]—*Parasitica*, 11, 4, p. 139, 1955.

Inoculations at the State Phytopathological Station, Gembloux, Belgium, of five plants each of tobacco, tomato, cucumber, petunia, *Datura stramonium*, and chilli pepper with sap expressed from the leaf of a forage beet showing typical symptoms of virus yellows [see preceding abstract] and, in addition, concentric yellow rings, affected only one cucumber plant, on which it gave rise to a yellowish mosaic. Eight days after inoculations from the affected cucumber plant, three of five cucumber plants developed a yellowish mosaic, while four of five Samsun tobacco plants showed slight vein-clearing and necrotic grey spots forming rings or zig-zag lines. It is, therefore, concluded that the virus from the beet with the ring spot symptoms was that of cucumber mosaic. This appears to be the first record of this virus in beets in Belgium, its occurrence being explained by the fact that winter spinach in an adjoining plot was infected by the virus.

Schneider (F.) & Mundry (K.-W.). **Die elektronenmikroskopische Darstellung des Mosaikvirus der Zuckerrüben.** [The electron-microscopic demonstration of the Sugar Beet mosaic virus.]—*Z. Naturf.*, 11b, 7, pp. 393-394, 1 graph. 1956.

At the Institute for Agricultural Technology and Sugar Industry, Brunswick, Germany, the sugar beet mosaic virus and the symptoms of infection on various hosts were studied with the help of the electron microscope with the following results.

Mechanical inoculation of Kleinwanzlebener E No. 9189 sugar beet was followed by the well-known typical secondary mottling; with incipient senescence primarily infected leaves developed dark green rings, mostly 0·5 to 1 mm. in width with a radius of 3 to 4 mm., on a yellow ground. On *Beta patellaris* the primary and secondary symptoms agreed with Bennett's description [*R.A.M.*, 29, p. 131]. On *Chenopodium amaranticolor* [cf. 33, p. 331], a hitherto unrecorded host, red-bordered necroses, the primary symptom, were followed successively by vein and leaf necrosis; recovery of infected plants was not infrequent. *Tetragonia expansa*, another host reported here for the first time, contracted only primary symptoms in the form of chloroses, becoming partially necrotic.

The examination by Johnson's water-pressure method [30, p. 403] of secondarily infected leaves of beet and *C. amaranticolor* revealed more or less rigid particles, which were particularly abundant in the latter host. The most frequent length in 429 particles (98 from beet and 331 from *C. amaranticolor*) was 700 mμ. No such elements were discernible in healthy material, and the particles are therefore presumed to be the viruliferous units of beet mosaic.

Canova (A.). **Rapporti tra Cuscuta e virus del giallume della Barbabietola.** [The relationships between Dodder and Beet yellows virus.]—*Ann. Sper. agr.*, N.S., 9, 3, pp. 549–552, 1955. [English summary.]

Though attempts made at the Experimental Laboratory of Plant Pathology, Bologna, to transmit the two forms of beet yellows virus present in Italy [cf.

R.A.M., 35, p. 410] and the yellow net virus [33, p. 331] from diseased to healthy beets by means of dodder (*Cuscuta epithymum*) failed, virus-free aphids (*Myzus persicae*) fed for 24 hours on dodder plants which had grown on beets affected by yellows virus transmitted the disease to beet, indicating acquisition of the virus by the dodder.

Bercks (R.) & Zimmer (K.). **Über den serologischen Nachweis der virösen Rübenvergilbung und den Virusgehalt kranker Rüben.** [On the serological diagnosis of Beet yellows virus and the virus content of diseased Beets.]—*Phytopath. Z.*, 26, 3, pp. 323–330, 1 graph, 1956.

In further studies at the Institute for Virus Serology, Brunswick, Germany, the recently developed method for the serological diagnosis of beet yellows virus [*R.A.M.*, 35, p. 501] was shown to be very reliable in experiments on greenhouse plants in the vegetative phase and on outdoor beets inoculated early in the season. In these plants the maximum virus content was in the oldest leaves, generally reaching a peak in the chlorotic areas and in the leaf tips [cf. 30, p. 256]. The maximum titres for seed beets were recorded in the basal, middle, and apical leaves before, during, and after flowering, respectively [cf. 35, p. 317].

Plant (W.). **The effects of molybdenum deficiency and mineral toxicities on crops in acid soils.**—*J. hort. Sci.*, 31, 3, pp. 163–176, 3 pl., 1956.

Field trials, in which cauliflower [*R.A.M.*, 35, p. 148], other brassicas, and lettuce [31, p. 417] were grown on several years on three acid soils treated with limestone, dolomite, gypsum, or sodium molybdate, were conducted in Wiltshire.

On the least acid soil only molybdenum deficiency was apparent; on soil of intermediate pH a mixed syndrome appeared of molybdenum deficiency and manganese toxicity, whilst on the most acid soil (pH 4) the syndrome also included aluminium toxicity. When cauliflower and lettuce were grown on the same soil for four consecutive years the fall in pH led to a change from symptoms of molybdenum deficiency to a syndrome of molybdenum deficiency and manganese toxicity.

Soil treatment with sodium molybdate was completely effective only on the least acid soil, but an unexpectedly high yield of cauliflowers with symptoms of manganese toxicity was obtained on soil of intermediate pH by spraying seedlings with molybdate in the seed bed.

With cauliflowers, soil molybdenum treatment gave fairly consistent yields in the first two years of the experiment but in the third year marketable heads were obtained only from limed plots and from plants which received molybdenum in the seed bed. A high concentration of molybdenum in the young seedlings (40 p.p.m. at transplanting) would appear to influence the later development of the plants.

Without seedling treatment low levels of molybdenum in the leaf were associated with whiptail, which is also characterized by accumulation of nitrate and a low level of ascorbic acid. It seems that these criteria may serve to differentiate whiptail induced by molybdenum deficiency from pseudo-whiptail caused by environmental checks [cf. 31, p. 96].

Budzier (H. H.). **Fluoreszenzmikroskopische Untersuchungen an Sporen des Kohlhernieerregers (Plasmodiophora brassicae Wor.).** [Fluorescence-microscopic studies on spores of the Cabbage club root agent (*Plasmodiophora brassicae* Wor.).]—*NachrBl. dtsch. PflSchDienst, Berl., N.F.*, 10, 2, pp. 33–35, 1956.

Sensitivity to plasmolysis was formerly the accepted criterion of viability in the spores of *Plasmodiophora brassicae*, but recent studies have demonstrated its unreliability. At the Institute for Phytopathology and Plant Protection, Rostock,

Germany, spores from galls on cabbage roots of the 1954 harvest were examined under the fluorescence microscope. Primary fluorescence could not be utilized for the differential diagnosis of viability, but viable and necrotic spores were readily distinguishable after a 15-minute application of acridine orange at a fluorochrome concentration of 1 in 5,000, since the living cells then show green and the dead ones red.

VETTER (A.). **Bericht über die Tagung der Arbeitsgemeinschaft zur Bekämpfung der Zuckerrübenkrankheiten.** [Report on the Meeting of the Working Party for the Control of Sugar Beet diseases.]—*Zucker*, 9, 13. pp. 332–333, 1956.

Some of the information in this report on a meeting of the above-mentioned organization held on 15th February, 1956, at Regensburg, Germany, has already been noticed from other sources. Representing the Kleinwanzleben Breeding Station, Einbeck [near Hamburg], Dr. KOCH described the results of spraying experiments against *Cercospora beticola* [cf. *R.A.M.*, 35, p. 259]. The average increase in yield during the period from 1952 to 1955 ranged from 2 to 16 per cent. In 1955 with a relatively low incidence of infection and applying a total of 12 kg. fungicide per ha., the increases in leaf, root, and sugar yields were computed at 45, 22, and 4·5 doppelzentner [about 90, 44, and 9 cwt., respectively] per ha. As usual, copper-based sprays gave the best results, while mercurials were preferable for seed treatment.

[L. A.] SCHLÖSSER (Kleinwanzleben) illustrated the morphological differences between individual physiologic races of *C. beticola* [35, pp. 258, 338] from the United States, Spain, Holland, and Turkey, and pointed out their potential influence on the performance of elite resistant varieties. The rate of progress of infection varies with different races, mixtures of which may be more virulent than single ones. Of late years resistant German varieties have contracted heavy infection in different areas of cultivation in the United States and Spain, while conversely, some that are highly resistant in America are susceptible in Germany. In the 1955 experiments the so-called 'Cercopoly' (*Cercospora*-resistant polyploid selections) combined a high degree of resistance with considerable productivity [cf. 34, p. 337], but their sugar content is still not quite adequate.

Spraying experiments against leaf spot were also reported from Austria [35, p. 62] by [A.] GRAF. The profitability of the treatments, comprising four applications each equivalent to 1·6 kg. pure copper per ha., was again demonstrated by the 25, 15, and 15 per cent. increases in leaf, root, and sugar yields, respectively. Increases in resistant varieties were mainly in the foliage. Bordeaux mixture is becoming steadily more popular in practice, especially since the development of a simplified mode of preparation with copper sulphate 'snow'. Judging by their satisfactory output, the eastern varieties Sedlmayr Beta I and Beta III are more suited than western ones to the Austrian climate.

Discussing connexions between the two main epiphytotic diseases of sugar beets, leaf spot and yellows virus, [W.] STEUDEL (Elsdorf, Western Germany), observed that resistance to *C. beticola* disappears, for reasons not yet fully elucidated, under the impact of the virosis. It is surmised that the obstruction in the flow of assimilates through the leaf induced by the virus facilitates the uptake of nutrients by the fungus, the lesions of which were more numerous on the yellowed than on the normal areas.

Dr. BACHTHALER gave an account of some diseases assuming economic importance in certain localities of eastern Bavaria. Thus, yellows virus develops annually in some districts of Lower Bavaria, affecting 5 to 15 per cent. of the plants in a stand. Because of the special risks involved in the occurrence of the virosis in areas where leaf spot is rife, continuous inspection of the crops for symptoms of yellows is practised throughout the growing season. Girth scab [*Actinomyces*

scabies: 35, p. 569] becomes widespread and causes appreciable damage in damp seasons.

Smith (P. G.) & Zahara (M. B.). **New Spinach immune to mildew.**—*Calif. Agric.*, 10, 7, p. 15, 2 figs., 1956.

The authors report the development at the University of California of a new variety of spinach immune from downy mildew [*Peronospora effusa*: *R.A.M.*, 35, pp. 571, 649]. The variety, named Califlay, is a cross of the variety Viroflay with a resistant wild spinach (P. I. 140, 467) from Iran, backcrossed to Viroflay, and is intended for use in conditions to which the latter is adapted.

Seay (W. A.) & West (S. H.). **The effect of seed treatment on yield and germination of garden Peas.**—*Proc. Soil Sci. Soc. Amer.*, 20, 2, pp. 198–200, 1956.

In studies at the Kentucky Agricultural Experiment Station in 1952 and 1954, designed to test the effect of *Rhizobium* and spergon (the latter for the control of [unspecified] soil organisms), separately and combined, on pea yields and germination [cf. *R.A.M.*, 22, p. 160; 29, p. 100; 32, p. 69; 35, pp. 502, 651] on Maury silt loam soil, the varieties used were Alaska, Blue Bantam, Radio, Shasta, and Thomas Laxton. The *Rhizobium* was provided by the Nitrogen Co., Milwaukee, Wisconsin, and (like the seed-protectant) was applied according to the manufacturers' directions. Germination tests were also performed in the laboratory in soil maintained at 40°, 45°, and 50° F.

Notwithstanding a trend towards improved yields from the treatments, more especially in combination, the increases were not significant. Spergon also increased germination, which was not affected by *Rhizobium*.

Murayama (D.) & Takeuchi (S.). **On a new rust fungus parasitic on Pea.**—*Ann. phytopath. Soc. Japan*, 19, 3–4, pp. 137–140, 3 figs., 1955. [Japanese, with English summary.]

The writers describe a new rust found on pea in Hidaka, Hokkaido, and named *Uromyces hidakaensis* n.sp., distinguished from *U. pisi* by fewer germ pores on the uredospores, irregular, verruculate walls of the teleutospores, and by its auteocism.

McEwen (F. L.) & Schroeder (W. T.). **Host range studies on Pea enation mosaic virus.**—*Plant Dis. Reptr*, 40, 1, pp. 11–14, 1956.

Studies at the New York State Experiment Station, Geneva, on the host range of pea enation mosaic virus [*R.A.M.*, 35, p. 63], using the pea aphid (*Macrosiphum pisi*) [*Acyrthosiphon pisum*] as a vector, showed that the following leguminous plants are susceptible: lucerne (six varieties) [34, p. 201], crimson clover, two types of white clover, white sweet clover (*Melilotus alba*), yellow sweet clover (*M. officinalis*), common vetch, hairy vetch (*Vicia villosa*), broad bean, rough pea (*Lathyrus hirsutus*), and garden pea. Two varieties of red clover, black medic (*Medicago lupulina*), alsike clover, birdsfoot trefoil (*Lotus corniculatus*), big trefoil (*L. uliginosus*) and red kidney bean (*Phaseolus vulgaris* var.) were not susceptible.

Foliage symptoms on most of the lucerne varieties tested were, however, absent, indicating that most of the common varieties are symptomless carriers of the virus, which may account for the failure of previous workers to note their susceptibility. Similarly, no symptoms were detected on infected Ladino and wild white clovers, but it is not known whether mild symptoms may appear as the plants age.

Van der Vliet (M.). **De bestrijding van de Bonenroest.** [The control of Bean rust.]—Reprinted from *Versl. PlZiekt. Dienst Wageningen* 124, 2 pp., 1 graph, 1954. [Received July, 1956.]

This is a slightly expanded version of a note already published on the control of

bean (*Phaseolus* spp.) rust (*Uromyces appendiculatus*) in Holland by spraying with zineb [*R.A.M.*, 34, p. 505]. The results obtained in comparative tests with captan and nirit were less satisfactory.

Waitz (L.) & Schwarz (W.). **Untersuchungen über die von Pseudomonas phaseolicola (Burkh.) hervorgerufene Fettfleckenkrankheit der Bohne. II. Untersuchungen der Pathogenese.** [Studies on the grease spot disease of Bean caused by *Pseudomonas phaseolicola* (Burkh.). II. Studies of pathogenesis.]—*Phytopath. Z.*, 26, 3, pp. 297–312, 4 figs., 2 graphs, 1956.

Within a few hours of inoculation, *Pseudomonas* [*medicaginis* var.] *phaseolicola* traverses the primary leaves of bean [*Phaseolus vulgaris*] plants from the site of infection to the shoot axis [*R.A.M.*, 35, p. 572]. Further spread of the bacteria is not effected continuously or by large masses but irregularly by single organisms which can multiply locally and produce necroses. Characteristic symptoms of systemic infection are foliar mosaic, truncation of the shoot axis, and retarded leaf development. Mosaic symptoms on the leaves are not necessarily associated with the presence of bacteria therein. Typical mottling develops only when the leaves are attacked in the process of unfurling; infection at a later stage results merely in a faint chlorosis, while fully grown, green foliage shows no symptoms.

Negative results were obtained in inoculation experiments with cell-free culture filtrates and with sap from diseased plants. Mosaic symptoms developed, however, in healthy plants inoculated by the injection method [loc. cit.] with culture filtrates of the organism in cell-free sap from bean plants which had been frozen and then thawed. Hence it is concluded that the toxin responsible for the form of mosaic associated with halo blight is secreted only during the growth of the bacterium in the host or in culture in unheated sap.

Doepel (R. F.) & Hardie (M.). **Downy mildew of Onions.**—*J. Dep. Agric. W. Austr.*, Ser. 3, 4, 3, pp. 313–314, 317–318, 4 figs., 1955.

Downy mildew of onions (*Peronospora destructor*) is widespread in Western Australia, often attaining epidemic proportions in market-gardens near Perth. Spraying is seldom undertaken locally, but in 1954 an experiment was conducted on a field crop in the Spearwood district in which the plants were sprayed five times at intervals of ten days with a number of fungicides. Only zineb improved yield, the figures being: control (unsprayed) 51·3 lb. of cured onions (average of three plots), zineb plus agral 62·3 lb., and zineb plus triton 65 lb.

Recommendations for control comprise improved market-garden sanitation, a three-years' rotation, and the spraying of field and seed crops with zineb (1½ lb. per 100 gals.) plus a good spreader at 4 to 6 fluid oz. per 100 gals. Spraying should begin before the disease develops and should continue at intervals of ten to 14 days.

Van der Vliet (M.). **De voetziekte, Fusarium oxysporum (Schl.) Sny. et Hansen, e. a. van Asperge, Asparagus officinalis L.** [The foot rot, *Fusarium oxysporum* (Schl.) Sny. & Hansen and other species, of Asparagus, *Asparagus officinalis* L.]—*Versl. PlZiekt. Dienst Wageningen* 127 (*Jaarb. 1954–1955*), pp. 209–210, 1955. [English summary.]

In connexion with the increasing extension and severity of foot rot in Dutch asparagus crops, a semi-popular account is given of the symptoms and etiology of the disease. *Fusarium oxysporum* is the most prevalent agent [cf. *R.A.M.*, 21, p. 236; 30, p. 307; 35, p. 573], but *F. culmorum* [18, p. 431; 28, p. 560] has been isolated consistently from the pulpy, carmine-red tissue of stems infected 10 to 15 cm. below soil-level.

Control measures should include careful selection of suitable soils; very early lifting from the seed-bed, followed by immediate drying and transplanting if

practicable, otherwise by temporary storage under cover, never in the open; disinfection with a thiram-containing compound before planting; and ploughing-up of the beds as soon as possible after cutting. In the event of infection developing despite these precautions, the plants should be cut down to the rootstock or eradicated to prevent further spread in the field.

Wolf (E. A.) & Ruprecht (R. W.). **Progress and problems in the development of an early-blight resistant Celery for Florida.**—*Proc. Fla hort. Soc.*, 68 (*1955*), pp. 178–181, 1956.

In this review of breeding work in Florida for resistance to early blight (*Cercospora apii*) of celery [*R.A.M.*, 26, p. 140; 31, pp. 362, 543] and possibilities for the future it is stated that the Emerson Pascal variety [31, p. 362], though grown successfully on a commercial basis at the Central Florida Station, has not found acceptance by growers, possibly because it is more subject to bolting and blackheart [calcium deficiency: 34, p. 73] than other Pascal varieties.

Lowings (P. H.). **Some storage rots of Celery caused by Centrospora acerina and other fungi.**—*Plant Path.*, 4, 3, pp. 106–107, 1 pl. (between pp. 90–91), 1955.

Examination of celery from several sources in Cambridgeshire and Lincolnshire, including batches of both early (self-blanching) and maincrop varieties, stored during the season 1954–5 under semi-commercial conditions at 33° F. for periods of up to three months showed that during the seventh or eighth week *Centrospora acerina* [*R.A.M.*, 23, p. 324; 33, p. 201] appeared in almost every batch. In one lot of early celery 21 per cent. of the plants were severely affected after 12 weeks, and of the remaining plants in this batch 44 per cent. developed symptoms of infection in less than a week after removal from storage. Symptoms developed more tardily in the maincrop variety. Infection was largely confined to the crown and petiole bases, the former eventually falling away completely. Conidia were produced very sparsely on the lesions, but there was no evidence that infection had spread during storage. Contaminated soil appeared to have been the source of inoculum, the primary lesions occurring in a ring round the crown; in a few cases, however, typical *Centrospora* rots were centred about wounds or bruises higher up on the outer petioles.

When plants were removed from storage, the mycelium of *Sclerotinia* spp., mainly *S. sclerotiorum* [cf. 33, p. 469], was frequently found on the roots and crown, though these were seldom severely rotted. As the plants were packed head to tail, the fungus had in many cases spread from the infected crowns to the foliage and petioles of adjacent layers, causing a destructive wet rot, sometimes faintly pink. Abundant aerial mycelium and occasionally sclerotia were also present. Approximately 80 per cent. of the plants in one batch of early celery became severely diseased after 12 weeks in storage. The maincrop losses were much less severe.

Many plants in every batch developed a wet rot of the leaves and petioles due to *Botrytis cinerea*. A few plants appeared to have become blighted by *Septoria apii-graveolentis* [34, p. 516] in storage. Mature plants sprayed with a suspension of *Septoria* pycnidiospores did not become infected even after ten weeks' storage at 33° under humid conditions, but natural infections of the leaves and petioles spread slowly on the stored celery, probably developing from incipient infections not noticed during packing.

Grogan (R. G.), Snyder (W. C.), & Bardin (R.). **Diseases of Lettuce.**—*Circ. Calif. agric. Ext. Serv.* 448, 28 pp., 25 col. figs., 1955. [Received July, 1956.]

In this well-illustrated bulletin the ten most common fungus and virus diseases affecting lettuce in California [*R.A.M.*, 35, p. 574 *et passim*] are described, the

area and seasonal distribution indicated, the effects of climate, and available methods of control. It is stated that the variety Mignonette escapes infection by tomato spotted wilt virus [cf. 24, p. 439] in the field.

Ridé (M.). **Sur une maladie nouvelle de l'Artichaut (Cynara scolymus L.).** [On a new disease of the Artichoke (*Cynara scolymus* L.).]—*C. R. Acad. Sci., Paris*, 243, 2, pp. 174–177, 1956.

The most conspicuous feature of a severe new bacterial disease of artichokes observed in Brittany, France, during 1954 and 1955 was the development on the bracts of the heads under warm and damp conditions (relative humidity exceeding 70 per cent.) of dark green, oily, confluent spots, the yellowish exudate from which was full of micro-organisms. A brown discoloration soon follows, due to necrosis of the superficial parenchyma, and finally the entire head may be involved and ultimately destroyed by secondary organisms. The bacterium, which was identified by morphological, cultural, and biochemical studies as a species of *Xanthomonas*, appears to enter the host principally through the numerous stomata on the lower surface of the bracts. Infection takes place after the frosts of May and June, when the size of the stomatal apertures is at a maximum. The leaves also may be attacked, yellowish, elongated, oily spots developing on the lower surfaces and veins.

Gandy (Doreen G.). **Some disorders of cultivated Mushrooms.**—*Plant Path.*, 4, 4, pp. 118–119, 1 pl. between pp. 128–129, 1955.

During the past two or three years losses in mushroom crops in England have occasionally been attributed to a brown soft rot of undetermined origin similar to that reported by Sinden and Hauser from the United States under the name 'La France' disease (*Mushroom Sci.*, 1, p. 96, 1950). A study of some unsatisfactory crops in which the first flush was affected was therefore undertaken. In the first, near Sittingbourne, Kent, in 1954, dead mushrooms, which were generally about half-size, occurred singly or in clumps. They were dry, shrivelled or discoloured, and the gills and veils of some were under-developed; others had long, thick stipes. Experiments suggested that the disorder was contagious.

The second crop examined was at Horley, Surrey, in 1955. Some of the mushrooms had reduced gills, many had long stipes and globular caps, and others had long, very thick stipes. In some the tissues, especially of the stipes, were translucent. The number of mycelial strands attaching the sporophores to the mycelium appeared to be less than normal. Many mushrooms died, but they did not become dry and spongy. Much scopulariopsis [*Scopulariopsis fimicola*: *R.A.M.*, 29, p. 493] was present. Again in experiments the casing-soil transmitted a disorder which killed the mushrooms before they reached maturity.

At a farm at Pevensey, in 1955, mushrooms with reduced gills and veils were very numerous and many died, turning golden brown and then becoming shrivelled and spongy. The first flush was affected, but cropping continued. On the fourth farm, at Chichester, in 1955, the only deformities consisted of lengthening or thickening of the stipe, or both. Death was accompanied by a slight discoloration. The first flush was affected and the disorder progressed steadily along the beds, but in these two places the disorder could not be shown to be contagious. In no instance did the symptoms observed entirely agree with those described by Sinden and Hauser, but the disorders found may, perhaps, have been different symptom-expressions of La France disease. Under-development of the gills and veils was the most distinctive common abnormality. The general absence of asymmetric caps and of a gritty texture in the stem tissues differentiated the disorders from mummy disease [34, p. 127].

Capoor (S. P.) & Varma (P. M.). **Studies on a mosaic disease of Vigna cylindrica Skeels.**—*Indian J. agric. Sci.*, 26, 1, pp. 95–103, 1 pl., 1956.

The authors describe further work [*R.A.M.*, 26, p. 479; 34, p. 81] on a mosaic disease of chavali cowpea (*Vigna cylindrica*) carried out at the Indian Agricultural Research Institute, New Delhi. Symptoms appeared on the seedlings seven to 19 days after carborundum sap inoculation. Seed from infected plants of chavali and cowpea (*Vigna sinensis*) [*V. unguiculata*] carried 17·3 and 22·7 per cent. infection, respectively. In transmission tests with insects usually found on the crop locally *Aphis medicaginis* infected 25 per cent., *Myzus persicae* 12, and *A. gossypii* four. The host range of the virus was extended by inoculation to *Crotalaria juncea* and soybean. Guar (*Cyamopsis tetragonoloba*) [*C. psoraloides*] developed numerous necrotic lesions.

The virus is distinguished from that described by Dale [33, p. 201] and from cucumber mosaic virus by its inability to infect *Dolichos lablab* and cucurbits. It is also distinct from those of Warid and Plakidas [32, p. 358]. It is perhaps closely related to the aphid-transmitted viruses causing mosaic of cowpea in the United States [20, p. 444; 21, p. 514] and China [26, p. 524]. It was not possible to decide its relationship with the mosaic of cowpea in India described by Vasudeva [21, p. 514]. Infectivity was retained for 19 days at 24° C. in sap, but was lost from dried leaves in under six. The dilution end point lies between 1 in 50,000 and 1 in 100,000.

The authors propose that the virus should be regarded as a variety of McLean's cowpea mosaic virus [28, p. 514], *Marmor vignae* var. *catjang*.

Coe (D. M.). **Antibiotic control of Cucumber downy mildew.**—*Proc. Fla hort. Soc.*, 68 (*1955*), pp. 246–248, 1956.

At the Indian River Field Laboratory, Fort Pierce, Florida, randomized plots of Marketer cucumbers planted on 14th April, 1955, were sprayed with zineb at 2 lb. per 100 gals. weekly until 31st May. As the treatment failed to give adequate control of downy mildew (*Pseudoperonospora cubensis*) [*R.A.M.*, 35, p. 511], agrimycin (15 per cent. streptomycin and 1·5 per cent. terramycin) was applied on 23rd May at rates of 100 and 200 p.p.m., alone, at 50 and 100 p.p.m. in combination with 2 in 100 tribasic copper sulphate, and at 100 p.p.m. with 4 in 100 of the latter, which was also used alone at 4 in 100. Seven applications were made of each treatment. The total yields for the various treatments were 111, 180, 195, 176, 186, and 204 lb., respectively, the corresponding indexes for disease control, estimated visually on a rating of 1 (no control) to 10 (complete control), being 3·63, 4·75, 5·13, 6·3, 6·88, and 6. The figures for the untreated were 126 lb. and 2·25. With 100 p.p.m. agrimycin control was significant at the 5 per cent. level; at 200 p.p.m. it was significant also at the 1 per cent. level; with the copper alone control was highly significant.

Ark (P. A.) & Gardner (M. W.). **Occurrence of angular leaf spot of Cucumber in California.**—*Plant Dis. Reptr*, 40, 1, pp. 61–62, 2 figs., 1956.

The epidemic of angular leaf spot (*Pseudomonas lacrymans*) of cucumber [*R.A.M.*, 35, p. 654], reported from Alameda County, California, in fields receiving overhead irrigation or where rows were occasionally flooded, was largely due to the dissemination of the disease in rows picked early in the morning when vines were still wet with dew. Rows regularly picked later in the day during the hot, dry period and after workers had washed their hands at mid-morning were much less infected.

Sinclair (J. B.) & Walker (J. C.). **A survey of ring spot on Cucumber in Wisconsin.**—*Plant Dis. Reptr*, 40, 1, pp. 19–20, 1956.

Investigations by the Department of Plant Pathology, University of Wisconsin,

Madison, from 1951 to 1954, inclusive, indicated that tobacco ring spot virus, already known on watermelon in Wisconsin [*R.A.M.*, 29, p. 135] and first noticed producing a mottled effect on cucumber fruits in 1951, is widely prevalent on cucumbers in central Wisconsin. The source of the inoculum is unknown. Seed transmission has been shown to be rare, but insect vectors and a wild host reservoir are suggested as responsible for the widespread occurrence of the disease.

Crossan (D. F.) & Lloyd (P. J.). **Artificial field inoculation of Cucumber with Colletotrichum lagenarium as an aid in the evaluation of control by fungicides.** —*Plant Dis. Reptr*, 40, 1, pp. 63–64, 1956.

At Delaware Agricultural Experiment Station, a uniform infection of cucumber with anthracnose (*Colletotrichum lagenarium*) [*R.A.M.*, 35, p. 71] was obtained in the field by inoculating the plants at the time of the production of marketable fruit with a spore and mycelial suspension of the fungus sprayed on to them late in the evening. Six applications between 19th July and 7th September of dithane M-22 (a maneb preparation at 1½ lb. per 100 gals.) or dithane Z-78 (2 lb.) [35, p. 507] reduced the infection from 9·7 (untreated) to 2·2 in a scale where 10 = all the leaves severely infected. Fruit yields were increased from 22·5 lb. (control) to 48·5 by dithane Z-78 and 42·8 by dithane M-22.

Borzini (G.) & Montaruli (A.). **Preparati acuprici e microcuprici nella lotta contro la Peronospora della Vite in Puglia.** [Non-copper and low-copper preparations in the control of downy mildew of the Vine in Apulia.]—*Ann. Sper. agr.*, N.S., 9, 3, pp. 553–570, 1 graph, 1955. [English summary.]

Further information is given on spraying trials carried out in 1953 in Apulia, Italy, with various non-copper and low-copper materials against downy mildew [*Plasmopara viticola*: *R.A.M.*, 35, p. 658]. Panse precoce and Regina dei vigneti vines were sprayed nine times from 12th May to 29th June, inclusive, with preparations at the strengths indicated [loc. cit.]: 0·5 per cent. S.R. 406 (active non-copper material 0·25 per cent.), 0·3 per cent. antiperonosporico A (0·195 per cent. active non-copper material), 0·3 per cent. cuprotan (0·27 per cent. active non-copper material and 0·00972 per cent. copper), 0·3 per cent. dithex (0·18 and 0·0115 per cent.), 0·3 per cent. cuproexina (0·09 and 0·01134 per cent.), ditramina (used in error at 1 per cent. [cf. loc. cit.]; 0·2 per cent. active non-copper material and 0·02 per cent. copper), Caffaro powder (0·165 per cent. copper), and Bordeaux mixture (0·25 per cent. copper).

On 13th and 14th July the treated Panse precoce vines had, respectively, 0·9, 3·66, 5·33, 5·22, 3·88, 3·2, 2·66, and 2·22 per cent. infected leaves, the corresponding figures for Regina dei vigneti being 1·11, 4·33, 8·44, 7·33, 4, 2·44, 4·33, and 5·22 per cent. The average yields for the former variety were, respectively, 1, 0·9, 1·2, 1·2, 1, 1, 1, and 0·9 kg. per vine, and for the latter 1·8, 1·9, 1·8, 1·8, 1·8, 1·9, 1·9, and 1·6.

Half the vines in each plot received, in addition, two supplementary applications on 3rd and 23rd October, which appreciably reduced leaf-fall. In some tests the presence in the spray material of only 0·015 to 0·02 per cent. copper was adequate to ensure a quite normal leaf-fall.

Eifert (J.). **Brown spot of vine-graftings and note of the enzyme-system inducing it.**—*Agrokémia Talajtan, 1953*, 3, pp. 209–218, 1953. [Abs. in *Hung. agric. Rev.*, 4, 1, p. 11, 1955.]

Brown spot in vine grafts and cuttings in Hungary is reported to be caused by tyrosinase and not by any pathogen. Forcing in a warm place and faulty grafting favour its development.

HIRATA (S.). **Colloid stability and turbidity of pressed-out juices from Potato tubers and roots of Radish as affected by virus infection.**—*Ann. phytopath. Soc. Japan*, 19, 3–4, pp. 133–136, 1955. [Japanese, with English summary.]

In further studies on the expressed sap of virus infected plants [*R.A.M.*, 32, p. 469] the writer found the expressed sap of healthy radish roots and potato tubers to be less turbid than from radish infected with [? radish] mosaic virus and potato with crinkle [virus X plus virus A] after standing for eight hours. The diseased sap was more quickly clarified than the healthy, especially radish. Centrifuged sap was less turbid than standing sap, but both clarified similarly. The quantity of precipitate (mainly protein) produced by saturated ammonium sulphate was correlated with the degree of turbidity. The writer considers the colloid stability of the expressed sap to be lower from the diseased than the healthy tissues owing to the lower buffering capacity of the former.

31. Deutsche Pflanzenschutz-Tagung der Biologischen Bundesanstalt für Land- und Forstwirtschaft in Kassel, 10.–14. Oktober 1955. [Thirty-first German Plant Protection Conference of the Federal Biological Institute for Agriculture and Forestry at Kassel, 10th to 14th October, 1955.]—*Mitt. biol. ZentAnst. Berl.* 85, 204 pp., 12 figs., 1 diag., 31 graphs, 1956.

Many of the papers presented at the above-mentioned conference [cf. *R.A.M.*, 34, p. 574] were concerned with entomological and herbicidal problems, and some of the phytopathological information has already been noticed from other sources.

The industrial-economic foundations of plant pathology were discussed in general terms by G. UNTERSTENHÖFER (pp. 66–75).

In F. REISCH's paper (pp. 75–80) on the industrial-economic position and importance of agricultural plant protection it is mentioned that the cost of certain operations, e.g., cereal seed disinfection and three to four fungicidal treatments of beet and potato crops against *Cercospora* [*beticola*] and *Phytophthora* [*infestans*], respectively, for 1953–4 had risen by an average of nearly 100 per cent. as compared with the period from 1949 to 1952, while the outlay for eight or nine spray applications in the orchard, five to seven in the vineyard, and 12 in the hop field was significantly higher.

W. RÖNNEBECK (pp. 93–95) points out that an area of 700,000 ha., representing almost two-thirds of the total under potatoes in the Federal German Republic, is in private hands and planted with inadequately selected seed, which is always more or less heavily infected by viruses and gives poor yields—conservatively estimated at a minimum of 10 per cent. below the normal. It would, however, be impracticable to supply these farmers with certified seed at the current prohibitive price, and the author presents a reasoned argument, based on a fair balance between public and private interests, for its reduction to a more realistic level, working out at a maximum of DM. 65 per ha. instead of 200. The statistics cited refer to the so-called 'less threatened' (transitional) regions of Western Germany [34, p. 389], as distinct from those set aside for elite seed production on the one hand, and the actual 'degeneration areas' on the other.

H. BREMER (pp. 122–129) discusses a number of crucial problems in the market-gardening industry. The first is the steady increase in viroses, e.g., brown root rot of tomato [34, p. 68], lettuce mosaic ('enemy No. 1', which is not infrequently responsible for 80 to 100 per cent. loss in the summer crop) [35, p. 505], and big vein, cucumber mosaic, onion yellow dwarf, and viruses of peas and beans (*Phaseolus* [*vulgaris*] and broad). In this connexion mention is made of the agency of dahlias and Calla lily [*Zantedeschia* sp.] in the transmission of cucumber mosaic and tomato spotted wilt, respectively [32, p. 284].

Among trace element deficiencies that of molybdenum in cauliflower [34, p. 575] occupies an important place.

Although fungal and bacterial diseases, in contrast to viroses, have generally declined owing to rapid advances in plant-protective technique, sclerotium-forming organisms are an exception which the author attributes to intensified nitrogenous manuring to secure heavy crops. Thus, onion white rot (*Sclerotium cepivorum*) [35, p. 573], once limited to areas where cultivation of the crop was unduly frequent, is now ubiquitous. *Sclerotinia sclerotiorum*, formerly encountered principally in damp greenhouses, appears to be on the increase in the field and has never been so prevalent as of late years on outdoor [French] beans and tomatoes. Other pathogens becoming more widespread in north-west Germany are *Alternaria porri* f. *dauci* [*A. dauci* f.sp. *porri*: 35, p. 573] on carrot and bean rust [*Uromyces appendiculatus*].

Plant protection questions of topical interest include the correct choice of disinfectants for special purposes, e.g., vegetable seed treatment, and proper methods of application; breeding for resistance; and the spray warning service, timely notifications by which are of particular value in the control of tomato blight [*P. infestans*] and *Septoria* [*apii*] on celery.

Difficulties in the control of diseases of ornamentals were the theme of H. A. Uschdraweit's contribution (pp. 129–133). They arise in part from the multiplicity of hosts ('Parey's Blumengärtnerei' lists 1,900 genera in 190 families), and in part from the need to provide artificial cultural conditions suited to the requirements of important exotic species. Standards of quality are also quite different from those operating in other branches of agriculture and horticulture, being directed towards the maintenance of an attractive appearance in the growing or flowering stage. On this account chemotherapeutic treatment must be restricted to periods when there is no risk of damage to the developing plant. Another problem is the lack of knowledge concerning the etiology and control of physiological disorders and viroses, only four pages being assigned to each of these groups in the latest edition of Pape's 'Diseases and pests of ornamental plants' [34, p. 151].

Urgent questions of plant protection in floriculture are raised by H. Pape (pp. 134–138). H. Kirchner reports (*in litt.*) that crude streptomycin was effective in preliminary tests in combating a damp rot of valuable new iris selections caused by *Erwinia carotovora*. Another troublesome bacterial pathogen is *Pseudomonas marginata* on gladiolus.

Among other fungal diseases requiring intensified study are the *Fusarium* wilt and foot rot [*F.* ? *dianthi*] and *Verticillium* wilt [*V.* ? *cinerescens*: 35, p. 767] of carnation; *Fusarium* foot rot of gladiolus [*F.*? *oxysporum* f. *gladioli*]; and foot rot and wilt of *Gerbera* (*F.*, *V.*, or *Phytophthora* spp., as the case may be); heart and stem rot of gloxinia and stem rot of *Kalanchoe*; stem rot of azalea [*Rhododendron*], associated with infection by the facultative parasite *Cylindrocarpon radicicola* [25, p. 215]; the widespread brown root rot of begonia, cyclamen [34, p. 152], primula, pelargonium, and other species due to *Thielaviopsis basicola*, which is also regarded as the principal agent of 'soil exhaustion' of sweet peas; and the dying-off of *Erica*, causing progressively heavier losses in nurseries and attributed by Osterwalder *et al.* in Switzerland (*Schweiz. Gartenbaubl.*, *1955*, 7. 1955) on the basis of positive inoculation experiments to a species of *Olpidium*. Mention is also briefly made of the continuing spread of viroses, including a 'leaf curl' of phlox which is causing substantial damage, and the importance of physiogenic disturbances is emphasized. According to Maatsch (also cited by Uschdraweit) [without particulars of date or place of publication in either contribution], 80 per cent. of all disorders of ornamentals fall into the latter category and result in the main from faulty cultural methods.

H. Klinkowski (pp. 139–150) summarizes the results of studies initiated in 1952 at the Institute for Phytopathology, Aschersleben, on gladiolus viroses in central Germany. Two main types of symptoms are differentiated, one characterized by spots and stripes on the petals, herein designated 'speckle', and the

other by a whitish or faintly yellowish foliar mottling, speckling, or streaking of varying extent, termed 'mottle'. Among the varieties affected by both forms were Mrs. Marks' Memory, Neues Europa, and Picardy. Transmission through the corms was effected more readily in the case of 'speckle' than in that of 'mottle', in which the percentage of successful transmissions was appreciably lower and subject to important modifications by weather conditions.

As a rule, the viroses do not cause epiphytotic losses, but in the course of years yields are substantially lowered, while 'speckle' is further responsible for severe reductions in marketability or even for total failure. In a comparative examination the average weights of healthy and 'speckled' corms of Picardy were 13 and 9 gm., respectively, equivalent to a reduction of 30·8 per cent., the corresponding figures for Schönrottraut being 15 and 9·2 (38·7), respectively. Other varieties tending strongly to 'degeneration' are Silentium and Dr. Dentz.

Two viruses were isolated from some 10 per cent. of bean (*Phaseolus vulgaris*), *Datura stramonium*, tobacco, and *Nicotiana glutinosa* plants inoculated mechanically with sap from diseased gladioli, namely, bean yellow mosaic and cucumber mosaic, of which the former induced typical symptoms on beans and broad beans and the latter on *N. glutinosa*. It proved impossible to determine, however, which of the two viruses was implicated in the different sets of symptoms on gladiolus. Both viruses were found to comprise a number of different strains, the variation being particularly marked in bean yellow mosaic, judging by divergences in dilution end points, thermal inactivation values, and symptoms on broad bean, which reacted to three out of 21 isolates by the development on the inoculated leaves of circular, red to red-brown necroses. On subsequent growth this feature became increasingly less distinct and was replaced by veinal necrosis. Discoloured streaks or spots also appeared on the stems, expanding rapidly and leading to premature collapse under greenhouse conditions, while outdoor plants were definitely stunted.

H. Zycha (pp. 155–160) enlarges on the theme of co-operation between biologists, chemists, and technicians in the sphere of timber preservation [*R.A.M.*, 35, p. 254].

The functions of the information and advisory services of the Schleswig-Holstein Plant Protection Bureau, Kiel, in connexion with timber preservation are described by F. Bolle (pp. 160–164).

H. Bömeke (pp. 164–165) reports from the Pomology Research Station, Jork [Schleswig-Holstein], that from 1950 to 1952 rotting apples were frequently submitted for inspection from warehouses in which they had been in contact with chemically treated wood. Experiments were accordingly conducted involving the exposure of Cox's Orange Pippins to indirect or direct contact with boards treated with different preservatives, assays being made monthly of the degree of rotting and of the taste and aroma of the fruit. All tar oil and chloronaphthalene compounds were found to be unacceptable for use in fruit storage depots on account of their olfactory components, and any salts with a hydrogen fluoride gas phase, e.g., the bifluorides, are likewise unsuitable. The odourless silicofluorides may be applied to walls, posts, and framework but not to shelves or boxes. UA-salts were adjudged to be unsatisfactory for the purpose in view, but the odourless U-compounds [32, p. 351] tested gave good results. In general, the toxicity of the chemicals declined gradually, and a reasonable period should be allowed to elapse between treatment of the wood and storage of the fruit; three weeks might suffice in the case of U-salts.

From the Institute for Plant Diseases of the University of Zagreb, Yugoslavia, J. Kišpatić (pp. 166–170) describes inoculation experiments with six wood-destroying fungi on blocks taken from the stems of 60- to 70-year-old field ash (*Fraxinus angustifolia*) trees, a widely cultivated species with excellent mechanical properties. Six of the trees were affected by 'brown heart' and two were without heartwood, the former contributing 116 and the latter 176 test blocks. Little is

known concerning the etiology of 'brown heart', which has been observed on quite young (20-year-old) as well as very old trees. The discoloration develops towards the stem base and is of variable shape, its borders mostly not running parallel with the annual rings. At the end of the tests, after three months, loss of weight was generally less in the 'brown heart' portion of the blocks than in the sapwood, except in the case of *Polyporus adustus*, in which the percentages were roughly equal (5·7). The figures for the sap- and heartwood blocks inoculated with the other species were as follows: *P. hispidus* 3·4 and 2·4, *Polystictus versicolor* 27·8 and 23·8, *Pholiota squarrosa* 3 and 1·4, *Coniophora cerebella* [*C. puteana*] 2·1 and 1·3, and *Daldinia concentrica* 5·8 and 2·8. The corresponding percentages for the specimens without heartwood were 9·2, 5, 38·7, 4·2, 4, and 5·2, respectively. It is evident from these data that 'brown heart' does not in the least detract from the fungal resistance of the wood, which has also been shown to be fully equal to the normal in technical and mechanical properties. This is a matter of considerable importance in view of the high industrial value of ash wood and the suspicion of inferior quality hitherto attaching to 'brown heart'.

Progress Report 1947–1954, Experimental Farm, Harrow, Ontario.—51 pp., 15 figs., 2 graphs, 1956.

In the section of this report dealing with tobacco (pp. 11–20) R. J. Haslam and W. A. Scott state that almost all Burley varieties at present in commercial use in Canada are resistant to black root rot [*Thielaviopsis basicola*: *R.A.M.*, 35, p. 160]. Haronic, Ottawa 174, Ottawa 194, Kentucky 56, Kentucky 57, Burley 2, 11–A, and 11–B (the last three from Tennessee) all having high resistance.

In the section on forage crops (pp. 21–26) G. F. H. Buckley, C. W. Owen, and C. G. Mortimore report that during 1953 and 1954 soy-beans growing on clay soils in Ontario were widely affected by manganese deficiency [cf. 34, p. 568]. A spray of manganese sulphate (8 to 10 lb. per acre) when the disorder appears should promote a return to the normal green colour in four or five days.

In the horticulture section (pp. 27–36) by T. B. Harrison and L. F. Ounsworth it is recorded that in 1950 bacterial spot of peaches (*Xanthomonas pruni*) became firmly established in the variety orchard at Harrow; marked varietal differences in susceptibility quickly became apparent. Infection reached a peak in 1952, when, however, the varieties Ambergem, Buttercup, Erli-Red-Fre, Golden Jubilee, July Queen, Marigold, Redskin, South Haven, Stark's Early Elberta, Sunbeam, and Vedette remained completely unaffected at Harrow. The varieties most widely planted in the State, Elberta, Golden Jubilee, Redhaven, and Halehaven are, as a rule, not very seriously affected. Infection was virtually absent in 1953 and 1954 [34, p. 630].

Harper, a hybrid muskmelon resistant to *Fusarium* wilt [*F. bulbigenum* var. *niveum*], which has outyielded four other varieties in *Fusarium* infested soil, is subject to powdery mildew [*Erysiphe cichoracearum*], but appears to be able to resist infection until most of the fruits have ripened. Iroquois is also resistant to wilt but is inferior in yield and quality.

Annual Report of the Director, Experimental Farms Service, 1954–1955.—56 pp., 22 figs., 1 map, Department of Agriculture, Canada, 1956.

In the section of this report [cf. *R.A.M.*, 34, p. 629] dealing with cereal crops (pp. 13–20) it is stated that two new durum wheats, D.T. 136 and D.T. 137, resistant to rust [*Puccinia graminis* ? and *P. triticina*], were increased during the winter of 1954–5 in the Yuma Valley, Arizona. In the search for soft winter wheat varieties resistant to dwarf bunt [*Tilletia controversa*: 35, p. 289], 73 named and numbered wheats were grown in a special nursery at Paisley, Ontario. The average

infection was 6 per cent., as against 14 per cent. for the susceptible control. Cornell 595. The oat varieties Rodney [34. p. 432] and Garry 27, licensed in 1953, perform well under severe rust [*P. graminis* and *P. coronata*] conditions. Barley diseases [unspecified] were very prevalent in 1954.

VALDEYRON (G.). **Rapport sur les travaux de recherches effectués en 1955.** [Report on the research work carried out in 1955.]—315 pp., 26 graphs, 1 map, 1 diag., Service Botanique et Agronomique de Tunisie. [1956. Mimeographed.]

In the section of this report [cf. *R.A.M.*, 35. p. 283] dealing with the resistance of selected lines of wheat to black rust [*Puccinia graminis*] in Tunisia in 1955 (pp. 55–56) A. PETIT states that the American varieties Reliance, Arnoutka, Mindum, Aune, Marquis, and Kota and some varieties commonly grown locally, including D. 116 Mahmoudi × Sbéi, Mahmoudi 552, Sindyouk × Mahmoudi 870, Chili, and EAP 63 A, were more severely infected than in 1954. This was mainly due to heavy rain in January, March, and April. Disinfection of wheat seed on a commercial scale against smut [*Ustilago tritici*: loc. cit.] gave satisfactory results (pp. 57–64). The results of seed treatments with organo-mercury preparations, organic compounds, copper compounds, and sulphur used alone and mixed with other materials, against wheat bunt [*Tilletia ? foetida*: 35. p. 284], and [loose] smut of oats [*U. avenae*: 34. p. 285] are presented (pp. 65–69). The data obtained showed that methoxyethylmercury silicate (15 per cent. mercury) gradually loses its efficacy, the effects of evaporation becoming perceptible after four years. Treatment annually with this material against wheat bunt for four years resulted in 1·9 per cent. infection in 1952 and 2·2 per cent. in 1955, whereas the corresponding figures with material kept only two years were 0·8 and 1·4, the respective average infection for the whole period being 4 and 2·4 per cent. The untreated controls averaged 87·5 per cent. in 1952, 75 per cent. in 1955, and 81·3 per cent. infection over the four years. Ethylmercury phosphate containing the same proportion of mercury was as effective against [loose] smut of oats and wheat bunt as methoxyethylmercury silicate. Against wheat bunt, the minimum concentration of HCB required was 10 per cent., which in two tests resulted in an average of 1·1 per cent. infection. Miscellaneous diseases identified at the Cryptogamic Laboratory included *Rhizoctonia violacea* [*Helicobasidium purpureum*] on carnation and *Oidiopsis* [*Leveillula*] *taurica* on chilli pepper. On pp. 70–87 A. PETIT and G. VALDEYRON present tabulated results of the histological examination of wheat seeds from various sources for the presence of internal smut (*Ustilago* [*tritici*]).

F. LAUDANSKI and B. JAMOUSSI, dealing (pp. 301–305) with diseases of market-garden crops and fruit studied at the Botanical Laboratory of the Higher School of Agriculture, Tunis, state that in 1955 premature leaf fall of chilli pepper caused losses of 20 to 50 per cent. of the crop. The condition was usually associated with [unspecified] virus diseases or *L. taurica* or both. The chief disease of potatoes was blight (*Phytophthora infestans*) [6. p. 598]: early treatments retarded infection and reduced its severity. In all the plots studied, taken together, the losses exceeded 50 per cent. of the crop, while in the Porto Farina area they amounted to between 50 and 100 per cent. Artichokes in Tunisia are affected by a complex of diseases. At the end of January, *L. taurica* [cf. 29. p. 493: 35. p. 505], *Bremia lactucae* [cf. 17. p. 217], and *Ascochyta hortorum* [loc. cit.] were present in every plot examined. In November and December, many plots were already affected by all three diseases and in a number of cases all three organisms were present in the same plot, on the same plant, and even in the same lesion. An as yet unidentified condition of progressive degeneration is also present, affecting over 60 per cent. of one-year-old plants and up to 100 per cent. of those two years old. Sharply defined, discoloured areas develop, and a month or two later affected plants appear shrivelled and laciniated.

Stapp (C.) & Knösel (D.). **Fortgeführte Untersuchungen über den Entwicklungscyclus und die Karyologie sternbildender Bakterien.** [Further studies on the development cycle and caryology of star-forming bacteria.]—*Zbl. Bakt.*, Abt. 2, 109, 13–19, pp. 416–428, 4 pl., 1956.

Electron-microscopic observations *in vivo* on the life-cycles of *Agrobacterium tumefaciens*, *A. radiobacter*, and *A. stellulatum*, using cell preparations treated with nucleases and proteases, confirmed the results of the phase contrast studies previously reported [*R.A.M.*, 35, p. 359] and left no doubt that star formation is a genuine process of fusion.

Crown gall of plants.—*Agric. Gaz. N.S.W.*, 67, 4, pp. 199–200, 3 figs., 1956.

Following a short popular note on crown gall disease (*Agrobacterium tumefaciens*) [*R.A.M.*, 29, p. 101] the author recommends that where galls appear on the base and roots of established stone fruit trees or grape vines they should be exposed and chipped off as thoroughly as possible and the wound, with the immediately surrounding bark, painted with a mixture of one part dinoc [31, p. 496] in four parts methylated spirit, repeated a month later, after which the soil is replaced.

Manigault (P.) & Salmon (Janine). **Nouveaux indices de la réactivité des tissus végétaux dans les processus de cancérisation expérimentale.** [New indices of the reactivity of plant tissues in the processes of experimental cancerization.]—*C. R. Acad. Sci., Paris*, 243, 2, pp. 173–174, 1956.

The application of micro-radiography to the study of tumours induced in *Pelargonium zonale* stems by inoculation with virulent strains of *Agrobacterium tumefaciens* [*R.A.M.*, 35, p. 424] revealed the gradual extension of opacity to X-rays in the intercellular spaces, beginning on the third day and involving the entire area of the neoplasm by the eighth.

Hickman (D. D.). **Studies on a bacteriophage of Xanthomonas pruni (E. F. Smith) Dowson.**—*Diss. Abstr.*, 16, 2, pp. 219–220, 1956.

A study was made of the factors affecting plaque formation by a bacteriophage specific for *Xanthomonas pruni* [see next abstract] at the University of Illinois. Normal and phage-infected bacteria were prepared for electron microscopy in a large number of different ways and a comparison made of the effects of these techniques on the structures observed in the sectioned bacteria. Details are given of the changes induced by phage infection.

Bernstein (L. B.). **The nature of lysogenicity in Xanthomonas pruni.**—*Diss. Abstr.*, 16, 3, p. 429, 1956.

At Kansas State College a strain of *Xanthomonas pruni* [see preceding abstract] resistant to phage Xp4 [*R.A.M.*, 35, p. 4] exhibited spontaneous lysis due to a new phage, designated Xp8 [loc. cit.]. It was established that Xp8 differed from all other *X. pruni* phage strains and on the basis of experimental results it was concluded that Xp8 originated as a result of the host-controlled modification of Xp4.

Bacterial anatomy.—*Sixth Symp. Soc. gen. Microbiol.*, ix+360 pp., 21 pl., 34 figs., 32 graphs, 1956.

In this volume, edited by E. T. C. Spooner and B. A. D. Stocker, published prior to the sixth symposium of the Society for General Microbiology, held in London during April, 1956, 15 papers are collected which were subsequently discussed at the meeting. K. A. Bisset (pp. 1–17) dealt with cellular organization in bacteria and concluded that their status in the flagellate super-kingdom (all organisms with flagellate cells) is equal with that of plants and animals. The morphology,

constitution, and inheritance of bacterial flagella were described by B. A. D. Stocker (pp. 19–40) and bacterial capsules by J. Tomcsik (pp. 41–66). Capsule formation and glutamyl polypeptide synthesis by *Bacillus anthracis* and *B. subtilis* were investigated by C. B. Thorne (pp. 68–80) and bacterial cell walls by M. R. J. Salton (pp. 81–110). C. Weibull (pp. 111–126) and K. McQuillen (pp. 127–149) contributed observations on bacterial protoplasts. Osmotic function and structure in bacteria were considered by P. Mitchell and Jennifer Moyle (pp. 150–180). The chromatin bodies of bacteria were discussed by C. F. Robinow (pp. 181–214), bacterial chromosomes and their mechanism of division by E. D. DeLamater (pp. 215–260), and the organization of 'nuclear material' in *Salmonella typhimurium* by O. Maaløe and A. Birch-Andersen (pp. 261–278). C. G. Elliott (pp. 279–295) dealt with chromosomes in micro-organisms including fungi and yeasts, concluding that many chromosome counts were unreliable owing to the difficulty of interpreting photomicrographs. J. R. G. Bradfield (pp. 295–317) discussed the organization of bacterial cytoplasm, C. L. Hannay (pp. 318–340) inclusions in bacteria, and W. H. Hughes (pp. 341–360) the structure and development of the induced long forms of bacteria. Comprehensive bibliographies are appended to each paper.

Christensen (C. M.). **Deterioration of stored grains by molds.**—*Commun. Wallerstein Lab.*, 19, 64, pp. 31–48, 5 figs., 1956. [French and Spanish summaries.]

This is an up-to-date survey of information on fungal deterioration of stored cereals, citing *inter alia* a number of contributions to the subject by the author and collaborators at the Minnesota Agricultural Experiment Station [*R.A.M.*, 35, p. 438].

Veenenbos (J. A. J.). **Onderzoek naar het voorkomen van roest, Puccinia spp., bij granen.** [Inquiry into the occurrence of rust, *Puccinia* spp., in cereals.]—*Vijfde Cocobro-Jaarbje, 1955*, pp. 44–51, 1 diag., 1955. [English summary.]

The essential information in this expanded, tabulated survey of the results of an inquiry into the incidence of cereal rusts (*Puccinia* spp.) in Holland from 1952 to 1954 has already been noticed from another source [*R.A.M.*, 34, p. 440].

Kelly (T. K.). **Wheat variety trials at Hermitage Regional Experiment Station.**—*Qd agric. J.*, 82, 4, pp. 189–194, 2 figs., 1956.

In field trials at the Hermitage Regional Experiment Station, Queensland, over the period 1951–54 Spica gave consistently good yields, its reaction to stem rust [*Puccinia graminis*: cf. *R.A.M.*, 29, p. 610] being nil to trace though its reaction to leaf rust [*P. triticina*: 35, p. 362] ranged from nil to medium-heavy. The slow-maturing variety Lawrence yielded irregularly but its reaction to leaf rust was usually nil or light and it bore no traces of stem rust. The susceptibility of Puora to stem and leaf rust reduced its yields in some seasons. Festival was fairly tolerant of frost and its resistance to stem rust during the trials was demonstrated by nil to medium infections, and to leaf rust by trace to light.

Stewart (D. M.). **A vacuum drying process for preservation of Puccinia graminis.** *Phytopathology*, 46, 4, pp. 234–235, 1956.

At the Minnesota Agricultural Experiment Station, using a modification of Sharp and Smith's lyophilization method [*R.A.M.*, 32, p. 15], the writer found that haemin was the best of four additives tested for the preservation of uredospores of *Puccinia graminis* from oats (races 7 and 8), wheat (15B and 56), and rye. Casein and albumin promoted the survival only of races 56 and 15B, respectively, while gelatin was of little use as a preservative. After 300 days' vacuum-drying at room temperature (50° to 95° F.) with an admixture of haemin, the percentages of infection obtained in inoculation tests on Little Club wheat were 90 and 94 for races 15B and 56,

respectively, on Bond oats 25 and 90 for races 7 and 8, respectively, and on Emerald rye 28, the corresponding figures for controls without additives being 0 and 3, respectively, for wheat, 4 and 0, respectively, for oats, and 0 for rye.

HART (HELEN). **Complexities of the Wheat stem rust situation.**—*Trans. Amer. Ass. Cereal Chem.*, 13, 1, pp. 1–14, 1955. [Abs. in *Biol. Abstr.*, 30, 6, p. 1740, 1956.]

The author surveys the position since 1950 of stem rust (*Puccinia graminis*) in the United States, particularly in relation to race 15B [cf. *R.A.M.*, 35, pp. 5, 664] and other races that have recently increased in the southern parts of the United States and Mexico and are potentially dangerous. Wheats with low-temperature resistance to several biotypes of race 15B are being used temporarily, but if certain other races or particular biotypes of 15B increase these wheats may not have adequate protection against epidemics [cf. 35, p. 210].

BASILE (RITA), LEONORI-OSSICINI (AGNESE), & ROSA (M.). **Identificazione di razze fisiologiche di Puccinia triticina Erikss. in Italia. Nota I.** [The identification of physiologic races of *Puccinia triticina* Erikss. in Italy. Note I.]—*Ann. Sper. agr.*, N.S., 9, 3, *Suppl.* pp. li–lviii, 2 figs., 1955.

This paper has already been noticed from another source [*R.A.M.*, 35, p. 431].

BASILE (RITA), LEONORI-OSSICINI (AGNESE), & ROSA (M.). **Identificazione di razze fisiologiche di Puccinia graminis tritici Erikss. et Henn. in Italia. Nota II.** [The identification of physiologic races of *Puccinia graminis tritici* Erikss. & Henn. in Italy. Note II.]—*Ann. Sper. agr.*, N.S., 9, 4, *Suppl.* pp. i–v, 1955. [English summary.]

This paper has already been noticed from another source [*R.A.M.*, 35, p. 431].

HAEGERMARK (U.). **Några iakttagelser rörande stråknäckarsvampens smittspridning.** [Some observations governing the spread of infection of the straw-breaking fungus.]—*Växtskyddsnotiser, Stockh., 1956*, 3, pp. 37–38, 1956.

Judging by the distribution of the eyespot produced by *Cercosporella herpotrichoides* in two winter wheat fields examined from this standpoint in Sweden [*R.A.M.*, 33, p. 343] in 1954 and 1955, there is little likelihood of combating the disease by burning the cut straw. The majority of the spots were situated less than 10 to 12 cm. from soil-level [cf. 25, p. 444], and it would be difficult to burn the stubble thoroughly enough to destroy those at the haulm bases. The possibility that the pathogen might be conveyed to other fields by means of infected manure was also investigated, but it is considered to be remote except under unusually humid conditions.

CONNIN (R. V.). **Oversummering volunteer Wheat in the epidemiology of Wheat streak-mosaic.**—*J. econ. Ent.*, 49, 3, pp. 405–406, 1956.

Continuing the observations initiated in 1953 on the oversummering hosts of wheat streak mosaic virus in Kansas [*R.A.M.*, 35. p. 756], the author found that volunteer wheat, which emerges before or shortly after the harvest of the sown crop, is of major importance in the epidemiology of the virosis.

NIEMANN (E.). **Fortschritte bei der Bekämpfung des Weizen- und Gerstenflugbrandes (Ustilago tritici (Pers.) Rostr. und U. nuda (Jens.) Rostr.) in den letzten Jahren. I. Die Heiß- und Warmwasserbeizung. (Ein Sammelbericht.)** [Progress in the control of Wheat and Barley loose smut (*Ustilago tritici* (Pers.) Rostr. and *U. nuda* (Jens.) Rostr.) of recent years. I. Hot- and warm-water disinfection. (A collective report.)]—*Z. PflKrankh.*, 63, 7, pp. 389–404, 1956.

Most of the 42 papers on the hot-water treatment of wheat and barley against

loose smuts (*Ustilago tritici* and *U. nuda*) cited in the author's survey of the literature from 1934 to 1955 have been noticed from time to time in this *Review*.

Loiselle (R.). **Influence of maternal tissue on loose smut infection of hybrid Barley kernels and inheritance of Dorsett loose smut resistance.**—*Diss. Abstr.*, 16, 4, pp. 620–621, 1956.

Histological examination at the University of Wisconsin of barley grain artificially infected by loose smut (*Ustilago nuda*) [cf. *R.A.M.*, 33, p. 225; 35, p. 517] showed that in the susceptible variety Odessa the mycelium grew (1) through the stigma, style, and chalaza, or (2) through the stigma, style, the inner epidermis of the ovary and the distal integument, or (3) directly through the ovary wall. The amount of mycelium in the crease, integument, aleurone layer, endosperm, and embryo depended on the stage of development of the ovary. In the resistant varieties Anoidium and Trebi mycelium was sometimes present but only in the chalaza and the bundle parenchyma, and extending out into the integument away from the crease. In seed from hybrids of reciprocal crosses between the susceptible and resistant varieties the maternal tissues exhibited mycelial development similar to that in the female parent. Maternal tissue thus influenced infection of the embryo though this influence was secondary in importance to the genotype of the embryo. The distribution of the F_3 progenies of the hybrids Colsess IV × Dorsett, Orange Lemma × Dorsett, and C.I. 2321 × Dorsett suggested that loose smut resistance in Dorsett was dependent on a single partially dominant gene. No association was demonstrated between the genes for loose smut reaction and those controlling nine markers.

Jogi (B. S.). **The heritability of agronomic and disease reaction characteristics in two Barley crosses.**—*Agron. J.*, 48, 7, pp. 293–296, 1956.

In genetical studies at Michigan State University the model proposed by Grafius (*Tech. Bull. S. Dak. agric. Exp. Sta.* 9, 1952) for segregating environmental and genetic variance was extended to estimate the heritability of agronomic and disease reaction characteristics in the F_6 of two barley crosses (Stewart and Kindred crossed with Bay). The author found that in the late stages of inbreeding genetic variance due to dominance is insignificant compared with that contributed by additive genetic effects. Heritability of resistance to mildew (*Erysiphe graminis*) was high, ranging from 69 to 95 per cent. In random plots infected by *Helminthosporium sativum* [*Cochliobolus sativus*] heritability percentages of resistance were low, no significant differences being obtained between families.

Hirata (K.). **Colony development of the powdery mildew on susceptible and resistant varieties of Barley.**—*Ann. phytopath. Soc. Japan*, 20, 2–3, pp. 73–76, 5 figs., 1955. [Japanese, with English summary. Received 1956.]

Entire barley leaves inoculated with *Erysiphe graminis* [*R.A.M.*, 35, p. 176] were fixed and cleared in formalin-acetic-alcohol, stained with acid fuchsin, and the colony development examined. On susceptible varieties a rectangular, later elliptical, colony was formed. Six days after inoculation conidia developed, at first in the centre of the colony. On resistant varieties fewer conidia were produced earlier on poorly developed, irregularly shaped colonies.

Rothman (P. G.). **Host-parasite interaction of eight varieties of Oats infected with race 202 of crown rust.**—*Diss. Abstr.*, 16, 2, p. 196, 1956.

At the University of Illinois eight varieties of oats, four highly resistant and four susceptible to race 202 of crown rust [*Puccinia coronata*: *R.A.M.*, 35, p. 601], were inoculated in the greenhouse. Following microscopic examination of leaves at interval of 12 and 24 hours up to 240 hours after inoculation the varieties were

classified into four groups on the basis of their reactions: I, highly susceptible; II, moderately susceptible; III, resistant; and IV, highly resistant. The selected criteria included the physical appearance of the substomatal vesicle, growth of the infection hyphae, the number of nuclei in the infection hyphae, the staining of the mycelium, formation of haustoria, amount of penetration within the leaf, cellular disturbances within the host cells, and the reproductive capacity of the parasite.

In group II the rate of growth of *P. coronata* lagged 24 hours behind that in group I and uredosori were surrounded by a definite chlorotic area. In groups III and IV the protoplasmic contents of the substomatal vesicles appeared granular rather than reticulate and only the hyphal tips were densely filled with protoplasm. In the third group antagonism between host and fungus became apparent after 72 hours and rapid necrosis of the inoculated leaf prevented further spread of the pathogen. Forty-eight hours after inoculation plants in group IV exhibited complete disorganization at the points of infection, the remainder of the tissue in infected leaves being unaffected.

Pearson (F. B.) & Judd (P.). **Oat varieties for grazing, hay, grain.**—*J. Dep. Agric. S. Aust.*, 59, 11, pp. 425–429, 447, 1956.

Following oat variety trials in South Australia [cf. *R.A.M.*, 34, p. 446] at the Roseworthy Agricultural College and the Departmental Research Centres at Kybybolite, Turretfield, Minnipa, and Parndana, the authors report that Ballidu, a Western Australian selection from a Mulga × Early Burt cross has good resistance to smut [*Ustilago avenae*] but is susceptible to stem rust [*Puccinia graminis*] and crown rust [*P. coronata*]. The new variety Acacia has high resistance to smut, but is moderately susceptible to leaf rust and one strain of stem rust.

Virtanen (A. I.) & Hietala (P. K.). **2(3)-benzoxazolinone, an anti-Fusarium factor in Rye seedlings.**—*Acta chem. scand.*, 9, 9, pp. 1543–1544, 1955.

At the Biochemical Institute, Helsinki, Finland, the authors isolated from Oiva rye seedlings, 10 cm. in height, after five to six days' germination in light and at room temperature, an anti-*Fusarium* factor which on an agar medium inhibited the growth of *F. nivale* [*Calonectria nivalis*: cf. *R.A.M.*, 33, p. 743] completely at a concentration of 0·05 and slightly at 0·01 per cent. A similar effect was exerted on *Sclerotinia trifoliorum* from red clover [33, p. 744]. On the basis of its empirical formula and chemical and physical characteristics the substance was identified as 2(3)-benzoxazolinone, which does not appear to have been previously found in nature.

Békésy (N.). **Über die vegetative und generative Übertragung von Mutterkorneigenschaften.** [On the vegetative and generative transmission of ergot properties.]—*Z. Pflanzenz.*, 35, 4, pp. 461–496, 12 figs., 2 diags., 6 graphs, 1956.

On the basis of extensive studies of many years' duration in Hungary [*R.A.M.*, 35, p. 521] and consultation of the pertinent literature, the author presents essential information on the vegetative and sexual inheritance of various properties of ergot (*Claviceps purpurea*) of rye, including shape, size, and colour of the sclerotia, tenacity in adhesion to the ear, virulence, and productivity.

Otto (H. J.). **The influence of nitrogen and potassium fertilization on the incidence of stalk rot of Corn in New York.**—*Diss. Abstr.*, 16, 4, pp. 621–622, 1956.

Gibberella zeae and *G. fujikuroi* are the chief causes of stalk rot, the most destructive disease of maize in New York State [cf. *R.A.M.*, 34, p. 364]. In field trials in 1953 six hybrids exhibiting various degrees of resistance were grown in soils receiving six fertilizer treatments, comprising combinations of two levels of potassium

with three of nitrogen. There were no statistically significant differences between the nitrogen treatments except for a trend towards increased yield and susceptibility with increasing levels. Potassium, however, reduced susceptibility, increased yield, and hastened maturity.

In 1954, increase of nitrogen in the presence of potassium increased both yield and susceptibility. Increasing potassium raised yield and reduced stalk rot. In similar trials in 1955 no differences in susceptibility appeared under the different fertilizer applications, but in further work potassium in addition to a base fertilizer reduced susceptibility. Omitting the additional potassium or adding extra nitrogen increased stalk rot damage.

Susceptible hybrids showed less change in susceptibility from treatment to treatment than did resistant or intermediate hybrids.

Otto (H. J.) & Everett (H. L.). **Influence of nitrogen and potassium fertilization on the incidence of stalk rot of Corn.**—*Agron. J.*, 48, 7, pp. 301–305, 1956.

The results of these experiments at the Agronomy Research Farm, Aurora, New York, on the effect of fertilizers on maize inoculated with *Gibberella zeae* and *G. fujikuroi* have been noticed from another source [see preceding abstract].

Sayed (S. G.). **Heterosis in Corn ; and the role of photosynthesis in the development of Puccinia sorghi Schw.**—*Diss. Abstr.*, 16, 2, p. 216, 1956.

At Cornell University normal infection by *Puccinia sorghi* of inoculated maize leaves was obtained in albino, yellow, virescent, half green and half albino, and albino striped maize leaves when 0·3 M sucrose was supplied via the tips of non-detached seedling leaves, indicating that photosynthesis is important for the developing pathogen solely for the provision of carbohydrate. Different genotypes of albino maize seedlings exhibited varying reactions towards different physiological races of *P. sorghi*, but in view of the fact that the seedlings received an identical sucrose supply it was concluded that carbohydrates were not involved in physiologic specialization in *P. sorghi*. An increase in the carbohydrate content of green wheat and maize seedlings forming differentials for *P. graminis* and *P. sorghi*, respectively, did not affect the expected rust reactions when inoculated with the appropriate races.

These results do not lend support to the widely held view that failure to isolate obligate parasites on artificial media is related to their dependence on a labile product of photosynthesis which is essential to their development.

Nour-Eldin (F.). **Phloem discoloration of sweet Orange.**—*Phytopathology*, 46, 4, pp. 238–239, 1 fig., 1956.

Phloem discoloration was observed during a survey of the citrus diseases of Egypt in 1955 on trees not less than five years old of the following varieties of sweet orange budded on sour orange rootstocks: the common or local ('balady'), which constituted about half the total number of cases, Navel, Valencia, Sukkary, Khalily White, 'balady' blood, and Sanguinoval. Most of the trees were stunted.

The discoloration is usually limited to an area of 1 in. or less above the bud union, but it may extend upwards to a height of 2 ft. A similar condition has been reported on sweet orange from China [*R.A.M.*, 22, p. 384], while J. F. L. Childs informed the author that an extremely mild phloem discoloration occurs in Florida on Pineapple and Valencia sweet orange trees on rough lemon stock.

Two types of stem-pitting were sometimes associated with the phloem discoloration, one imparting a grooved or channelled aspect to the cambial face of the wood and the other circular or conoid. In a few trees the sour orange stock was also very slightly involved.

The symptoms herein described resemble those of the bud-transmissible cachexia disease of Orlando tangelo (*Citrus paradisi*×*C. reticulata*) in Florida [35, p. 603]. The Egyptian survey revealed symptoms typical of cachexia on 'balady' mandarin trees budded on sour orange.

Pending the completion of transmission experiments the nature of these diseases in Egypt must remain uncertain, but the general aspect and orchard distribution of the affected trees suggest transmission by budding with infected material.

Russo (F.). **Manifestazioni di 'foliocellosi' o 'mottle leaf' degli Agrumi in Sicilia.** [The symptoms of 'foliocellosis' or 'mottle leaf' of Citrus in Sicily.]—*Ann. Sper. agr.*, N.S., 9, 6, pp. 1289–1307, 1955. [English summary.]

After noting the symptoms of zinc deficiency in citrus trees [cf. *R.A.M.*, 35, p. 293 and next abstract] growing in different parts of Sicily, the author describes tests carried out in 1952 and 1953 to control the condition, in which the best results were obtained by spraying the trees with a mixture of 600 gm. zinc sulphate, 300 gm. sodium carbonate, and adhesive per 100 l. water. A bibliography of 73 titles (almost all in English) is appended.

Russo (F.) & Raciti (G.). **Sintomi di carenza di manganese negli Agrumi. Metoda di cura.** [The symptoms of manganese deficiency in Citrus. A method of treatment.]—*Ann. Sper. agr.*, N.S., 9, 4, pp. 871–881, 1955. [English summary.]

Citrus trees in various parts of Sicily are affected by manganese deficiency [cf. *R.A.M.*, 24, p. 366; 33, p. 227]. The size of the leaf is not reduced, as in zinc deficiency, and the chlorotic areas are pale green rather than yellowish. In very serious cases only the veins remain a normal green, the parts between being pale green to bronze; the symptoms then resemble those of iron deficiency.

On trees deficient in manganese, chlorotic leaves are most numerous in the shady parts and those exposed to the north; with zinc deficiency the reverse is true. In late autumn many branches become almost completely defoliated, whereas on trees deficient in zinc, a few young leaves remain. The fruits show no visible symptoms of manganese deficiency, but those affected by zinc deficiency are small, and in severe cases production is reduced.

The most conspicuous manganese deficiency symptoms develop during the irrigation period on trees (especially lemon) given an excess of water. In non-irrigated plantations the symptoms are milder.

As a result of successful spraying trials carried out in the field it is recommended that trees affected by manganese deficiency only should be sprayed with a mixture consisting of 300 gm. commercial manganese sulphate, 150 gm. Solvay sodium carbonate, and a sticker, per 100 l. water. If both manganese and zinc deficiency are present, the mixture should also contain 600 gm. zinc sulphate, with 450 gm. of sodium carbonate or slaked lime [cf. preceding abstract]. The trees may be sprayed at any time, but applications made in spring give the best results.

Bock (K.) & Rayner (R. W.). **Control of Coffee berry disease in Kenya.**—*Nature, Lond.*, 178, 4526, pp. 217–218, 1956.

Coffee berry disease, attributed to *Colletotrichum coffeanum* [*Glomerella cingulata*: *R.A.M.*, 35, p. 591] in the East Rift area of Kenya was not controlled in early experiments with perenox, phenyl mercury, fixtan, tulisan, or calcium sulphamate. In later field trials during 1955, 15 treatments were compared in six replications, and were applied at monthly intervals during the rainy seasons, March to May and November to December, five applications in all, with the exception of perenox which was applied at fortnightly intervals throughout the season. Two treatments only

gave effective control of *G. cingulata*, viz., fortnightly perenox and monthly verdasan. The best possibility of control is thus offered by verdasan. Calcium sulphamate treatments at 1, 3, and 6 per cent. were all highly phytotoxic. In laboratory tests with detached berries, in which results comparable to those of the field trials were obtained, griseofulvin at 880 p.p.m. gave similar control to verdasan.

Kuhfuss (K.-H.). **Über die Bedeutung der Sporendichte bei der künstlichen Infektion von Linum usitatissimum L. mit Colletotrichum lini Manns et Bolley.** [On the importance of spore density in the artificial infection of *Linum usitatissimum* L. with *Colletotrichum lini* Manns & Bolley.] —*Phytopath. Z.*, **26**, 3, pp. 313–322, 2 figs., 1 graph, 1956.

At the Institute for Plant Breeding, Bernburg, Germany, flax plants of the Bernburger Ölfaser [oil-fibre], Flachskopf, Sorauer Lusatia, and Löbauer Blau varieties were inoculated by three methods at two stages of development (autotrophic and heterotrophic seedling) with *Colletotrichum lini* [*C. linicola*]. Inoculation with conidial suspensions of varying density, ranging from 10,000 to 10,000,000 spores per ml. liquid, under otherwise comparable conditions resulted both in divergent types of infection and in considerable variations in its intensity [cf. *R.A.M.*, **32**, pp. 253, 431].

By the eighth day after inoculation by spraying with the lowest concentration all four varieties showed spots on the cotyledons, while the foliage leaves were also attacked except in the case of Lusatia. At the next strength of 100,000 spores per ml. the hypocotyl was also involved, Bernburger Ölfaser sustaining less damage than the other varieties. Partial collapse of the cotyledons occurred in Flachskopf and Löbauer Blau. In the former variety and Lusatia the shoots were heavily spotted. A concentration of 1,000,000 spores per ml. caused a reduction in the extent and an increase in the number of spots on the hypocotyls. The percentage of cotyledonary collapse ranged from 75 to 100 in all varieties and the shoots were uniformly attacked. At the greatest strength spotting of the hypocotyls was more pronounced in all the varieties except Löbauer Blau. Similar reactions were observed in respect of cotyledonary infection. Shoot lesions, however, increased in number and extent, respectively, in Bernburger Ölfaser and Lusatia, whereas Flachskopf and Löbauer Blau developed smaller necroses. The spots on the foliage leaves were uniformly larger and caused the collapse of some 50 per cent. on Löbauer Blau.

Using an immersion method described by Kommedahl *et al.* (abs. in *Phytopathology*, **40**, pp. 15–16, 1950), the percentages of infection obtained by the ninth day at the several densities ranged from 18 to 31 for Bernburger Ölfaser, 31 to 34 for Flachskopf, 18 to 29 for Lusatia, and 31 to 39 for Löbauer Blau.

Application of the inoculum with a paintbrush resulted in a high percentage of infection (68·6) on Bernburger Ölfaser even at the minimum strength, the corresponding figures for Flachskopf, Lusatia, and Löbauer Blau being 42·6, 29·3, and 47·6, respectively. At the next concentration the incidence of infection on Bernburger Ölfaser was lower (56·3 per cent.), whereas on the other three varieties it was roughly twice as high as that obtained at the lower rate. At a strength of 1,000,000 spores per ml. all the varieties were attacked with practically equal severity, while at the maximum rate of 10,000,000 Flachskopf showed a slight reduction (92 as against 96 per cent.) and small increases were recorded for the others.

It is apparent from these data that symptom expression in flax plants inoculated with *C. linicola* depends essentially on spore density. In this connexion attention is drawn to a parallel relationship in bean [*Phaseolus vulgaris*] anthracnose (*C. lindemuthianum*) [cf. *R.A.M.*, **8**, p. 349; **11**, p. 277].

Stewart (R. N.) & Schindler (A. F.). **The effect of some ectoparasitic and endoparasitic nematodes on the expression of bacterial wilt in Carnations.**—*Phytopathology*, 46, 4, pp. 219–222, 1 fig., 1956.

At the Plant Industry Station, Beltsville, Maryland, carnation cuttings already inoculated with the root-knot nematodes *Meloidogyne hapla*, *M. javanica*, *M. incognita*, *M. i. acrita*, and *M. arenaria*, and the ectoparasitic *Helicotylenchus nannus*, *Xiphinema diversicaudatum*, and *Ditylenchus* sp. were superinfected with suspensions of *Pseudomonas caryophylli* from 24-hour-old nutrient broth cultures [*R.A.M.*, 33, p. 723].

All five root-knot species and *H. nannus* increased the rate of wilting in the presence of bacteria, as also did mechnical wounding of the roots; when bacteria were absent only *M. i. acrita* exerted a comparable effect. *X. diversicaudatum* did not influence the development of wilting with or without bacteria, while the addition of inoculum containing *D.* sp. resulted in a decrease of symptom expression in the presence of bacteria. The five carnation varieties used (Tetra Sim, Mrs. Guba, Saugus Pink, McCully 310–W, and Fuchsia) varied in their reactions to the different root-knot nematodes.

It is concluded that both endo- and ectoparasitic nematodes are factors in the bacterial-nematode disease complex of carnations. Most of the greenhouse soils examined yielded mixed populations of several genera of plant-parasitic nematodes. The function of the latter in the complex is apparently restricted to the infliction of injuries for the entry of *P. caryophylli*.

Rogers (M. N.). **Some effects of moisture, leaf temperature depression, and leaf susceptibility on the development of powdery mildew of Roses, caused by Sphaerotheca pannosa var. rosae.**—*Diss. Abstr.*, 16, 4, pp. 622–623, 1956.

In studies of powdery mildew (*Sphaerotheca pannosa*) infection of rose at Cornell University [*R.A.M.*, 22, p. 386] it was found that when leaf temperature, measured by a thermocouple, fell 5° F. below that of the surrounding air, the relative humidity near the upper leaf surface, measured by a modified Dunmore electrical hygrometer, rose to 15 per cent. above ambient humidity. This was in agreement with theoretical expectations. The infection of antirrhinum by *Puccinia antirrhini* and of tomato by *Cladosporium fulvum* at an ambient relative humidity of 85 per cent., when leaf temperatures were below the surroundings, was taken to substantiate this finding, as these pathogens are known to require higher humidities for germination.

When inoculated rose leaves in air at three levels of humidity were cooled below ambient temperature so that the relative humidity at the upper surface ranged from 55 to 100 per cent. there were no significant differences in the severity of the resultant infection until there was condensation on the leaves; nor did repeated cycles of high (90 per cent.) and low (30 per cent.) ambient relative humidity affect severity. Continuous water films on leaves were less favourable to mildew development than were discrete droplets. Intermittent mist following inoculation had an inhibitory effect, particularly on conidial germination, the degree of inhibition being almost directly related to the length of exposure. Mist applied after infection was established caused no immediate reduction in mycelial development or sporulation, but when treatment was continued for five or six days collapse of the conidia, whether attached or detached, occurred.

The combined thickness of the epidermal cell wall and the cuticle, which was correlated with the age of the leaf, was found to be among the most important of the other factors studied. Lower surfaces were more susceptible than the upper. There was no significant difference in susceptibility between leaves produced under intermittent mist and others developing under normal greenhouse conditions.

It was concluded that while relative humidity may play some role in the epidemiology of powdery mildew of roses under commercial growing conditions, other environmental factors are of greater importance.

Dosdall (Louise T.). **A petal blight of Chrysanthemum incited by Itersonilia perplexans.**—*Phytopathology*. 46. 4. pp. 231–232. 1956.

In November, 1951, *Itersonilia perplexans*, originally described from the Philippines by Derx (*Bull. Jard. bot. Buitenz.*, Sér. 3, 17, pp. 465–472, 1948) and re-studied by Olive (*Bull. Torrey bot. Cl.*, 79, pp. 126–138, 1952) on material from Louisiana, was isolated at the Minnesota Agricultural Experiment Station from blighted pom-pom type chrysanthemum blossoms in a local commercial greenhouse. The apical halves of about a quarter of the outer petals of each blossom suddenly turned brown and shrivelled during several warm days when the greenhouse was tightly closed. Ventilation checked further spread of the disease.

The infected tissue was filled with broad hyphae, with prominent clamp-connexions at the septa, which produced typical sterigma-like conidiophores with asymmetrical ballistospores, 10 to 17 by 7 to 10 μ, in a moist chamber. The fungus was readily isolated from the petals on potato dextrose, malt, or 1·5 per cent. yablum agar. The hyphae in the numerous colonies developing within 48 hours produced chlamydospore-like structures, each with a conspicuous clamp-connexion at its base, and the ballistospores characteristic of the species. Inoculation experiments on two white pom-pom blossoms resulted in the browning of about 20 petals on each, while many more bore minute brown and red spots, each of the latter involving about six host cells of the otherwise white tissue. Each of these spots contained a broad intercellular hypha. In the brown tissue the collapsed cells were occupied by typical hyphae, chlamydospore-like bodies, and countless ballistospores. Irregular, brown blotches, 1 to 2 cm. in diameter, had also developed on the leaves. Reisolations were made from blighted, red-spotted, and apparently healthy white petal tissue and from brown and green leaf tissue. The blossoms of three varieties of hardy garden chrysanthemums were also inoculated with positive results, but foliar lesions developed only on Sun Red.

The scanty available information on *I. perplexans* is briefly recapitulated. The species or variants of the same appear to be widely distributed, having been recorded from Japan in *Nagaoa* (*Mycol. J. Nagao Inst.*), *1952*, pp. 62–66, 1952, Washington (*R.A.M.*, 29, p. 369), New York (31, p. 416), and probably England (loc. cit.). The author calls for further work on the life-history, taxonomy, and pathogenicity of the fungus.

Gallucci-Rangone (Maria M.). **Intorno ad altri Colletotrichum osservati su Orchidee.** [On further species of *Colletotrichum* observed on Orchids.]—*Ann. Sper. agr.*, N.S., 9, 4, *Suppl.*, pp. lxxix–xc, 3 figs., 1955. [English summary.]

An account is given of the author's study of *Colletotrichum gloeosporioides* (*Glomerella cingulata*) and *C. falcatum* [*G. tucumanensis*], found on *Cypripedium insigne* and *C. callosum*, respectively. Both plants were growing in a greenhouse at S. Mauro Torinese, in the province of Turin, Italy, and each constitutes a new host for its fungus.

The chlamydospores of *G. cingulata* were invariably angular, with well developed 'points' which gave them a star-shaped appearance, dark brown with a small, round, lighter guttule in the centre, and terminal, lateral, or intercalary. Those of *G. tucumanensis* were round, pyriform, or irregular, but never star-shaped. Some had small, wart-like protuberances. The colour was a pale nut-brown. Sometimes they were terminal, but much more often than was the case with *G. cinguiata* they were intercalary or arranged in chains.

The author concludes that the chlamydospores of species of *Colletotrichum* can serve as supplementary taxonomic characters.

Gallucci-Rangone (Maria M.). **Una nuova specie di Colletotrichum rinvenuta su Cattleya sp.** [A new species of *Colletotrichum* found on *Cattleya* sp.]—*Ann. Sper. agr.*, N.S., **9**, 3, *Suppl.* pp. xi–xv, 2 figs., 1955.

A description is given of a new species of *Colletotrichum* found, together with a species of *Gloeosporium*, on leaves of *Cattleya* sp. growing in the grounds of the Villa Borromeo at Isola Bella, Lake Maggiore, Italy. The affected leaves bore long, necrotic, mostly blackish, somewhat indefinite areas. The fungus, which is named *Colletotrichum servazii*, is characterized by epiphyllous, brownish-black, mostly gregarious, frequently confluent, erumpent acervuli 500 μ in diameter; up to 200 setae, rigid, pluricellular, black, and measuring up to 170 by 4·5 μ; and cylindrical and slightly clavate, chlorinous conidia averaging 26 by 7 μ.

Hino (I.) & Katumoto (K.). **Illustrationes fungorum bambusicolorum III.** [Illustrations of Bamboo-inhabiting fungi III.]—*Bull. Fac. Agric. Yamaguti Univ.* 6, pp. 29–68, 39 figs., 1955. [Received 1956.]

A further 39 fungi occurring on bamboo in Japan [cf. *R.A.M.*, 35, p. 611] are described and illustrated, including four new genera and 24 new species.

Asuyama (H.), Komuro (Y.), & Syoda (K.). **Studies on the Alfalfa mosaic virus.**—Jubilee publication in commemoration of the sixtieth birthdays of Prof. Tochinai and Prof. Fukushi, pp. 101–107, 1955. [Abs. in *Rec. Res. Fac. Agric. Univ. Tokyo* 5, p. 3, 1956.]

During 1952 a mosaic disease was observed on lucerne in Japan. From its host range and physical properties the virus was identified as a strain of *Medicago* virus 2 [lucerne mosaic virus: cf. *R.A.M.*, 33, p. 87].

Zhdanov (L. A.). Селекция Подсолнечника на устойчивость к Заразихе и ржавчине. [Selection of Sunflower for resistance to Orobanche and rust.]—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad. agric. Sci.*], **21**, 2, pp. 14–19, 1956.

The sunflower variety G–1219, giving higher oil yields in experiments at Krasnodar from 1950 to 1953 than the standard local variety 1646 VNIIMK, and the new hybrids Nos. 14902 and 14905, producing higher seed and oil yields than 8931 VNIIMK, itself a very high oil yielding variety, are reported by the Pan-Soviet Scientific Research Institute of Oil and Ethereal Oil Crops, U.S.S.R., to be resistant to rust (*Puccinia helianthi*) [cf. *R.A.M.*, 19, p. 167; 35, p. 301].

At the Don Experiment Selection Station cultivated sunflower varieties were crossed with the wild *H*[*elianthus*] *ruderalis* to obtain rust-resistant varieties. In the hybrids Nos. 4162, 4138, 4172, 4226, 4198, 4395, and 4176 there were (in descending order) higher percentages of uninfected plants (ranging from 71·3 to 35·3 per cent.) than the standardized high-yielding control variety 6540 VNIIMK (2·8). Oil yields per ha. averaged 257 kg., as against 171 kg. for the control.

Shterenberg (P. M.). Фузариозные заболевания зернобобовых культур в условиях Одесской области и агробиологическое обоснование мер борьбы с ними. [*Fusarium* diseases of leguminous crops under the conditions of the Odessa region and an agrobiological basis of controlling them.]—12 pp. Thesis. Pan-Soviet Scientific Research Institute of Plant Protection, Leningrad, 1949.

In the southern regions of the U.S.S.R. yields of leguminous crops are reduced by 30 per cent. or more by diseases, particularly those caused by *Fusarium* spp. [*R.A.M.*, 30, p. 135; 32, p. 382; 35, p. 612]. From 1946 to 1948 the author carried out field and laboratory investigations at the Odessa Scientific Research Station of Husbandry on the biology of *Fusarium* spp. attacking leguminous plants, the

conditions of disease development, and disease control, which is based on the elimination of soil infestation, proper crop rotation, and breeding of resistant varieties.

Schenck (N. C.) & Gerdemann (J. W.). **Taxonomy, pathogenicity, and host-parasite relations of Phoma trifolii and Phoma herbarum var. medicaginis.** —*Phytopathology*, 46, 4, pp. 194–200, 1 fig., 3 diags., 2 graphs, 1956.

At the Department of Plant Pathology, University of Illinois, a comparative study was made of 18 isolates of *Phoma herbarum* var. *medicaginis* West. ex Rab. (regarded as the valid name for the causal organism of black stem of lucerne, now generally attributed to *Ascochyta imperfecta* [*R.A.M.*, 35, p. 461]), and 22 of *P. trifolii*, responsible for black stem of red clover [13, p. 32].

Pycnidial formation in both species was meristogenous. On potato dextrose agar light was essential for the sporulation of most isolates of *P. trifolii*, whereas *P. h.* var. *medicaginis* sporulated uniformly under all gradations of light and darkness. The appearance of monospore cultures of *P. trifolii* was highly variable, some being white and fluffy, while others were light brown, flat, and appressed or dark brown to black and semi-appressed. On the contrary, those of *P. h.* var. *medicaginis* were indistinguishable from the parent culture, i.e., concentric, white, and fluffy at first, later darkening at the centre and eventually turning brown to black throughout.

There were no significant differences in the spore dimensions of the two species on potato dextrose agar, sterilized red clover or lucerne stems, and inoculated host tissue. On sterilized plant stems the spores of both species were predominantly non-septate, though *P. h.* var. *medicaginis* produced more uniseptate on potato dextrose agar than did *P. trifolii*. The rates of spore germination and growth were more rapid in *P. trifolii* than in *P. h.* var. *medicaginis*. The spores of the former species germinated well at 35° C. and very slowly at 5°, whereas those of the latter did not germinate at either extreme. The optimum temperature for growth of *P. trifolii* from mass transfer was near 20° and for that of *P. h.* var. *medicaginis* between 20° and 25°, with a maximum for both at 30° and no development at 35°.

The two fungi induced the same types of root rot and damping-off lesions on seedlings of both hosts, though all isolates were more virulent on their own than that of the other species. No consistent correlation was observed among three intergrading characters, namely, pathogenicity, spore septation, and growth rate of the two species. Both fungi penetrated lucerne and red clover directly through the stomata, developing intercellularly at first in the leaves and becoming intracellular in dead or dying cells. In the stems of the two hosts the hyphae of both species were intra- as well as intercellular in living cells. Girdling of young stems was also caused by both species.

Although *P. h.* var. *medicaginis* and *P. trifolii* appear to be closely related, it is debatable whether the observed similarities are sufficient to justify their amalgamation into a single species. In any case, however, the continued use of the name *A. imperfecta* [16, p. 258] is regarded as unacceptable.

Pieri (G.). **Intorno ad una forma batterica isolata da Mele colpite da Botrytis cinerea Pers.** [On a bacterium isolated from Apples attacked by *Botrytis cinerea* Pers.]—*Ann. Sper. agr.*, N.S., 9, 6, *Suppl.* pp. lxxxi–lxxxviii, 1 fig., 1955. [English summary.]

At the Experimental Station of Vine Cultivation and Oenology, Conegliano, Italy, apples removed from storage and found to be infected by *Botrytis cinerea* were placed in a damp chamber at 22° to 24° C. After a few days, they became severely rotted and some emitted a dense, opaque liquid which contained two forms of

bacteria, of which one, *Bacterium* [*Pseudomonas*] *syringae* [cf. *R.A.M.*, 29, p. 468; 34, p. 706], was pathogenic.

When healthy Canada Pippin and Abbondanza apples were wound-inoculated with this bacterium in association with *B. cinerea*, symptoms identical with those in the naturally infected fruits developed rapidly. With *B. cinerea* alone the symptoms were similar, but developed more slowly, and there was no bacterial ooze. With the bacterium alone, a brownish-grey spot developed at the inoculation site and slowly spread over the whole surface, the fruits becoming soft and shapeless, emitting a bacterial liquid, and later becoming mummified. The bacterium was re-isolated from fruits in an early stage of infection. All attempts at inoculation with the bacterium by surface contact gave negative results.

Broadfoot (H.). **Control of 'twist' in the Gravenstein Apple.**—*Agric. Gaz. N.S.W.*, 67, 4, pp. 180–188, 14 figs., 1956.

'Flat limb' or 'twist' of apples [*R.A.M.*, 35, p. 775] has caused considerable losses in Gravenstein orchards in New South Wales. Trials over 22 years at the New England Experiment Farm, Glen Innes, indicate that scions from affected trees will always develop the disease; that the disease may develop even where clean scions and clean rootstocks are used, if these are not compatible; and that it is necessary to induce the development of stem roots as quickly as possible, preferably by planting with the union at seven or eight inches below ground level in a nursery, where soil moisture can be controlled more readily than in an orchard. Since the original rootpiece is only a nurse root, the growth of which is inhibited once the stem roots have developed, almost any compatible rootpiece may be used, but for complete safety Gravenstein rootstocks are recommended. In the trials very good results were achieved with clean Gravenstein scions on Northern Spy rootpieces.

Goidànich (G.) & Govi (G.). **La ticchiolatura del Melo.** [Apple scab.]—15 pp., 2 col. pl., 3 figs., 2 graphs, *ex* Moderna Frutticoltura, Edizioni Agricole, Bologna, 1955.

In this lecture the authors present a succinct account, based on the published results of studies conducted by various workers in Italy and elsewhere, of the epidemiology of apple scab (*Venturia* [*inaequalis*: *R.A.M.*, 33, p. 436; 34, p. 40; 35, p. 104, and next abstract]) and the control of the disease by fungicides.

Govi (G.). **Risultati di prove di lotta contro la ticchiolatura del Melo.** [Results of tests on the control of Apple scab.]—Reprinted from *Frutticoltura*, 6, 15 pp., 1 fig., 9 graphs, 1955.

The results are presented of spraying trials against apple scab (*Venturia inaequalis*) [see preceding abstract] carried out from 1952 to 1954 in various localities in the Romagna and the province of Verona, Italy. Of the materials tested, Bordeaux mixture at 0·6 to 0·8 per cent. gave the best control, followed by various forms of colloidal copper sulphur (70 per cent. active sulphur, 5 per cent. metallic copper), and then by dithiocarbamates. As ascospore emission begins and becomes dangerous during the early vegetative stages of the trees, a pre-floral treatment is indispensable; the best results were given by two spray applications, the first at bud opening, the second at the closed button stage.

Shay (J. R.) & Williams (E. B.). **Identification of three physiologic races of Venturia inaequalis.**—*Phytopathology*, 46, 4, pp. 190–193, 1956.

Three physiologic races of the apple scab fungus (*Venturia inaequalis*) [*R.A.M.*, 33, p. 731] are differentiated on the basis of studies at Purdue University Agricultural Experiment Station, Indiana, namely, (1) commonly encountered in the United States and other countries [C.M.I. map No. 120]; (2) collected in South

Dakota and pathogenic to Dolgo [*R.A.M.*, 31, p. 189], certain segregates of the Russian variety R 12740–7A [33, p. 487] and Geneva (*Malus pumila* var. *niedzwetzkyana*); and (3) collected in Nova Scotia, Canada, which also attacks *M. p.* var. *niedzwetzkyana*. The exceptional pathogenicity of race 2 was shown to be controlled by three separate genes, each specific for one of the differential varieties. The virulence of race 3 on Geneva is governed by another single gene distinct from that operating in race 2.

Roosje (G. S.). **Treatment of Apple and Pear scab in Holland.**—*Plant Prot. Overseas Rev.*, 4, 4, pp. 128–135, 4 pl., 1955.

Preventive spray applications to control apple and pear scab (*Venturia inaequalis* and *V. pirina*) in Holland [*R.A.M.*, 35, p. 302] are made in accordance with national and regional warnings. Copper sprays (those containing 50 per cent. oxychloride being the most popular) apparently give the longest protection, but many other chemicals are used according to such circumstances as temperature and rainfall. The organic mercury compounds employed give the shortest protection. If preventive spraying is not possible curative sprays (those applied when the hypha from the germinating spore has become independent of it) may sometimes be effective and require fewer applications provided they are made within 96 hours after the start of the period of infection, as forecast by the Mills card [loc. cit.].

Only organic mercury preparations have proved satisfactory in curative spraying for scab, but their ineffectiveness against apple mildew (*Podosphaera leucotricha*), which has recently been on the increase in Holland and to which the popular Jonathan apple is very susceptible, may require a return to dispersible sulphur sprays to control both diseases.

Stobwasser (H.) & Müller (G.). **Freilanduntersuchungen über die Möglichkeit einer Bekämpfung von Obstschorf Venturia inaequalis und Venturia pirina und Rebenperonospora (Plasmopara viticola) mit Kondensationsnebel.** [Outdoor experiments on the possibility of combating fruit scab, *Venturia inaequalis* and *Venturia pirina*, and Vine *Peronospora* (*Plasmopara viticola*) by means of condensation mist.]—*Z. PflKrankh.*, 63, 6, pp. 321–333, 4 figs., 1 diag., 1956. [English summary.]

In further experiments at the Institute for Plant Protection, Stuttgart-Hohenheim, Germany [*R.A.M.*, 35, p. 694], effective control of *Venturia inaequalis* on apple and *V. pirina* on pear was obtained by the application of captan (2·3 kg. per ha.), thiram (2·5), and an organic copper compound (2·1) in the form of aerosols with a Jaeger apparatus; the results of tests with flowers of sulphur (3·6 kg. per ha.) were less satisfactory. Treatment of vines presented considerable difficulty owing in part to the steepness of the terraced slopes and also to the prevalence of cross winds, necessitating adjustments to the machine. However, the vines were thoroughly enveloped in captan and the development of infection by *Plasmopara viticola* was largely, though not entirely, prevented. There was a certain amount of damage from leaf scorch, especially where supplementary copper treatments were given, which is attributed to the liberation of small quantities of hydrochloric acid from the captan particles.

On the basis of these tests the prospects for the use of aerosols in the domain of plant protection are regarded as generally encouraging.

Canova (A.). **Phytophthora cactorum (Lebr. et Cohn) Schröt., agente di marciume delle Pere.** [*Phytophthora cactorum* (Lebr. & Cohn) Schröt., an agent of Pear rot.]—*Ann. Sper. agr.*, N.S., 9, 3, pp. 667–681, 2 pl., 2 figs., 1 graph, 1955. [English summary.]

A full account is given of a rot of Passacrassana pear fruits both on the tree

(shortly before reaching commercial maturity) and in storage in Italy in 1953, caused by *Phytophthora cactorum* [cf. *R.A.M.*, 34, p. 728; 35, p. 98]. The morphological and biological characters of the fungus in culture are described and details are given of the germination of the sporangia in various conditions of temperature, light, and aeration, and in colonies of different ages and on different media. The transformation of sporangia into chlamydospores was observed, most frequently in old colonies grown on oat agar or malt agar at 5° to 10° C. This appears to be the first record of the fungus on pear fruits in Italy.

Kawamura (T.) & Ishii (K.). **Clinical report on the black spot disease of Japanese Pears. IV. Fungicidal properties of mercuric sprays.**—*Ann. phytopath. Soc. Japan*, 20, 1, pp. 4–9, 8 graphs, 1955. [Japanese, with English summary. Received 1956.]

In pot and field spraying experiments in Japan a combination of Bordeaux mixture and uspulun was most effective for the control of black spot (*Alternaria kikuchiana*) of Japanese pear [*Pyrus pyrifolia*: *R.A.M.*, 34, p. 460]. Uspulun alone sprayed on pear leaves inhibited spore germination but its activity decreased rapidly with time and particularly in bright sunlight. Liquid uspulun was superior to SR 406 [captan], Bordeaux, OB–21, dithane, and manzate when applied to young, inoculated shoots.

Van Katwijk (W.). **Ringvlekkenmozaiek, vergelijken met enkele andere mozaiekverschijnselen bij Peer.** [Ring spot mosaic compared with some other mosaic symptoms on Pear.]—Reprinted from *Versl. PlZiekt. Dienst Wageningen* 124, 5 pp., 3 figs., 1954. [English summary. Received July, 1956.]

The pear viroses hitherto encountered in Holland are mosaic [*R.A.M.*, 35, p. 374], veinlet chlorosis, probably a symptom of stony pit [loc. cit.], and an entirely distinct disease for which the name of ring pattern mosaic virus is proposed. Diagnostic is the presence in proximity to the veins of pale to yellow-green, sometimes faintly brown-tinted, pointed-oval rings, which may be accompanied by wavy lines. In cases of severe infection the rings and the tissue between may turn brown and become necrotic, leading to the death of large areas of the leaf and defoliation. The margins are often very wavy and the leaf much misshapen in consequence of local growth disturbances. Particularly virulent symptoms have been observed on the Zoete Brederoede, Beurré d'Anjou, and Nouveau Poiteau varieties. The virus was readily transmitted by grafting from diseased Beurré d'Anjou to healthy Comtesse de Paris trees.

Rossetti (Victoria) & Maltese (Aida E.). **O cancro dos ramos de Pessegueiro.** [The canker of Peach branches.]—*Biológico*, 22, 4, pp. 57–62, 3 figs., 1956.

In December, 1955, the canker of peach branches caused by *Fusicoccum amygdali* [*R.A.M.*, 33, p. 678] developed in an exceptionally severe form at the Agricultural Colony of Itaquera, São Paulo, Brazil. The disease is believed to be identical with one attributed by Carneiro in Rio Grande do Sul in 1938 to *Phoma persicae* [17, p. 472]. The Perola, Jewel, and Rosado de Itaquera varieties were particularly susceptible. Positive results were obtained in inoculation experiments with mycelium from pure cultures but not with spores. Pending the conclusion of control experiments (which were in progress at the time of writing), the authors recommend strict attention to preventive dormant treatments and the immediate excision and destruction of infected shoots.

Adam (A. V.) & Powell (D.). **The age of cultures of Xanthomonas pruni in relation to infectivity.**—*Phytopathology*, 46, 4, pp. 232–233, 1956.

The results of inoculation tests with Emerson broth cultures of *Xanthomonas*

pruni on three-year-old Elberta peach trees, performed at the Illinois Agricultural Experiment Station on 18th August, 1953, in connexion with studies on the epidemiology of the pathogen [*R.A.M.*, 34, p. 732] indicated that infectivity increased progressively up to 48 hours after incubation and then declined. Thus, 10 days after inoculation the average number of infected leaves per tree inoculated with a 48-hour culture was 43 compared with 1·5 for one of six and 8·5 for one of 576 hours. On 28th May, 1954, the corresponding numbers of cankers per tree were 11·7, 0·7, and 0·5, respectively. This result tallied with the production of the maximum number of active bacteria in plate cultures, which was obtained after 72 hours' incubation.

Wishart (R. L.). **Apricot gummosis.**—*J. Dep. Agric. S. Aust.*, 59, 10, pp. 389–398, 22 figs., 1956.

Much of the material in this popular review article on apricot gummosis caused by *Eutypa* sp. has been previously noted [*R.A.M.*, 35, pp. 356, 376]. Commenting on the danger of transmission by pruning tools the author draws particular attention to the saw, on which fragments of infected wood may be carried over and embedded in healthy wood. He recommends that saw cuts be disinfected with gentian violet and sealed with grafting wax, mastic, paint, or other persistent non-injurious material, and that saws and secateurs should be disinfected with 5 per cent. formalin after each tree.

Prescott (G. C.), Emerson (H.), & Ford (J. H.). **Determination of cycloheximide (acti-dione) residues in Cherries.**—*J. agric. Food Chem.*, 4, 4, pp. 343–345, 1 graph, 1956.

At the Department of Microbiology, The Upjohn Co., Kalamazoo, Michigan, the persistence of actidione residues on cherries treated with the antibiotic against leaf spot [*Coccomyces hiemalis*: *R.A.M.*, 29, p. 417] was first determined by a method involving chloroform extraction of the macerated fruit, followed by bio-assays of the extracts with *Saccharomyces pastorianus*, as described by Whiffen (*J. Bact.*, 56, p. 283, 1948). This procedure permitted the detection of as little as 0·04 p.p.m. actidione in the fruit, but was found to be insufficiently sensitive for the assay of residues on fruit sprayed according to the standard schedule. Ripe Montmorency fruits on two orchard trees that had already been sprayed four times (one with fixed copper and lead arsenate throughout and the other with ferbam and lead arsenate three times and finally with copper sulphate) were accordingly treated in July, 1954, with 30 p.p.m. actidione at 200 lb. pressure. After the first day the residues had a half-life period of about 24 hours. This rate of inactivation is much higher than that occurring in solutions of the antibiotic in dilute acetic acid at pH 3·3 at 25° C., under which conditions some two-thirds of the original activity was retained for 3½ months in (unpublished) experiments by J. H. Ford. It is suggested that an enzyme system in the ripe cherries may accelerate the inactivation process.

Fulton (R. H.). **A study of virus diseases of Strawberry in Michigan.**—*Diss. Abstr.*, 16, 4, p. 640, 1956.

In investigations at the Michigan State University strawberry type 2 [? yellows] virus was ubiquitous in all varieties (75 per cent. of 575 samples) from all parts of the State. Type 1 [? strain of strawberry crinkle] virus, traceable to imported plants, was present in 15 per cent. Mixed infections totalled three per cent. Leaf roll and witches' broom viruses [*R.A.M.*, 35, p. 467] were also reported. Only 6·8 per cent. of the samples were free from virus, and these were used to establish a virus-free foundation planting.

Fragaria virginiana and the cultivated varieties Dunlap [34, p. 160] and Robinson developed no symptoms with type 1 or 2 viruses. Catskill reacted to type 1 with

a transient flecking, and to type 2 with interveinal chlorosis. All plants with leaf roll symptoms also carried type 2 virus. Reddening of the petioles was a characteristic symptom of the former on *F. vesca*, while Catskill and Dunlap exhibited leaflet chlorosis and mottling with extreme marginal rolling; symptoms on Robinson and Gem were mild.

Dodder (*Cuscuta campestris*) transmitted witches' broom, leaf roll, and type 2 viruses, and also showed *Potentilla argentata*, *P. recta*, and *P. anserina* to be latent carriers of type 2.

The viruses investigated were not transmissible mechanically, nor by seed, pollen, soil, plant fragments, or the root rot nematode.

Type 2 virus was inactivated *in vivo* by zinc salts and by dry heat from 36° to 40° C. over various periods, 38° for eight days giving the best results.

Virus-free Robinson plants contained four per cent. more total and amino nitrogen than those infected by type 2 virus, which exhibited a 58 per cent. reduction in transpiration rate.

Thornberry's variegated clones with virus-like particles (Thornberry, H. H., Valter, A. E., & Beeson, D. M. *Phytopathology*, 41, p. 35, 1951) were infected by type 1 virus.

Vaughan (E. K.). **A method for eliminating the red-stele fungus from valuable Strawberry stocks.**—*Phytopathology*, 46, 4, pp. 235–236, 1 fig., 1956.

A method for the propagation of strawberry stocks which ensures the elimination of *Phytophthora fragariae* has been used successfully at the Oregon Agricultural Experiment Station [*R.A.M.*, 34, p. 306] during the past two seasons. It is based on the established principles that (1) the fungus does not invade the crowns or stolons even of susceptible varieties; (2) it grows poorly at soil temperatures above 65° F.; and (3) it does not flourish in well-drained soil.

The plants, well fertilized, are potted early in spring and the runners subsequently produced are rooted in steam-sterilized soil (equal parts washed mason's sand, sawdust, and sandy loam) in flats supported above the pots. The runners are carried up to these on bamboo stakes to avoid contact with the parent soil, glass wool around the mother plants preventing contamination by splashing onto the flats. During the subsequent winter, placing the flats in a screenhouse exposed to rain and fairly low temperatures ensures visible development of red stele in any susceptible varieties that may be still infected.

Foschi (S.). **Gloeosporium olivae (Petri) n. comb., agente di antracnosi su rami, foglie e frutti d'Olivo.** [*Gloeosporium olivae* (Petri) n. comb., an agent of anthracnose of the branches, leaves, and fruits of Olive.]—*Ann. Sper. agr.*, N.S., 9, 4, pp. 911–926, 4 pl. (2 col.), 5 figs., 1955. [English summary.]

In 1953 the fungus described by Petri in 1907 as *Cylindrosporium olivae* [*R.A.M.*, 30, p. 235] was observed on olive trees growing in the Romagna, Italy. At the end of May the affected trees were wilted, and the young branches bore numerous yellowish, slightly depressed spots; these gradually enlarged, and in autumn were either oval and 2 to 5 mm. in diameter or girdled the branch, the bark in the affected areas having peeled off. By mid-November 30 per cent. of the fruits on affected trees bore numerous, scattered, slightly depressed, dark chesnut-coloured spots 1 to 2 mm. in diameter, with an ochraceous centre situated on a lenticel and each surrounded by a persistent, whitish halo. After some time, these lenticel spots gave place to small, ochraceous, slightly depressed spots, and the fruits rapidly dried up. When apparently healthy fruits from affected trees were kept for a few days in a saturated atmosphere at 25° C. they developed characteristic symptoms of the disease. At the beginning of December 2 to 3 per cent. of the leaves on the affected trees each bore three or four round, slightly depressed spots 1 to 4 mm. in

diameter, milk-white, with a dark red rim, which was visible only on the upper surface.

Inoculations of fruits and branches by inserting inoculum deep in the tissues gave positive results, but those made superficially were unsuccessful.

The fungus isolated from the wood and the fruit of affected trees was identical in all its cultural and morphological characters with *C. olivae*, which in 1915 Petri himself, without explanation, referred to as *Gloeosporium olivae*. In culture it grew very slowly, in which respect it differs from *G. olivarum* [34, p. 380; 35, p. 658], the agent of olive 'leprosy'. The hyaline hyphae measured 2 to 3 μ in diameter, and the globose, subcutaneous, pulvinate, erumpent, brownish acervuli were 450 to 500 μ in diameter and were surrounded by a ring of sterile, white, flexuose hyphae 3 to 8 μ in diameter and pointed at the apex. The hyaline, continuous, oval, curved conidia were rounded at the extremities and measured 12 to 25 by 2 to 3 μ.

As Saccardo in his Sylloge expresses the view that Unger's genus *Cylindrosporium* (1833) is 'a *Gloeosporium* with filiform conidia'; as Petri cannot possibly have intended to refer the fungus to Greville's *Cylindrosporium* (1823), which has cylindrical conidia; and as, finally, the stromatic mass is brown and the conidia are no narrower than in many other species of *Gloeosporium*, the author transfers the fungus to *Gloeosporium* as *G. olivae* (Petri) n. comb. (= *Cylindrosporium olivae* Petri).

The control methods recommended include spraying with Bordeaux mixture, pruning away dead and infected branches, keeping down insects, harvesting the fruit directly it has ripened, and reducing the storage period as much as possible.

Ciferri (R.), Rui (D.), Scaramuzzi (G.), Candussio (R.), & Bonfante (S.). **La 'leptonecrosi' da borocarenza dell' Olivo. Parte I.** ['Leptonecrosis' of the Olive caused by boron deficiency. Part I.]—*Ann. Sper. agr.*, N.S., **9**, 6, pp. 1309–1342, 3 col. pl., 21 figs., 2 maps, 1955. [English summary.]

After referring to earlier work on 'leptonecrosis' or 'progressive decline' of olive trees in Italy caused by boron deficiency [*R.A.M.*, **34**, pp. 605, 792] and stating that general agreement exists among Italian workers as to what constitute the characteristic features of the condition [**33**, p. 363 *et passim*], the authors describe in detail the symptoms observed by them on trees growing in Liguria and the province of Verona.

Salaschek (H.). **Zur Problematik der Normung von Schwefel-Spritzmitteln.** [On the problems of the normalization of sulphur sprays.]—*Anz. Schädlingsk.*, **28**, 12, pp. 179–184, 9 figs., 1956.

At the Plant Protection Department of Gebr. Borchers, Goslar, Germany, the author studied some of the physical problems connected with sulphur sprays, paying special attention to wettable ultra-sulphur, used, e.g., against vine mildew (*Oidium*) [*Uncinula necator*: *R.A.M.*, **34**, p. 78]. The electron microscope revealed a variability and plasticity in the deposits of ultra-sulphur which were practically absent from those of products with coarser and more compact particles. Thus, the drops of a freshly made 0·15 per cent. suspension of ultra-sulphur form a diffuse layer of superimposed particles, each measuring approximately 0·3 μ and consisting of sulphur and dry protective colloid. After a few hours' ageing, however, the particles frequently appear in the form of long-spun, criss-cross 'threads', evidently a new development since it is considered unlikely that these were already present in the original aggregates. The stability of the ultra-sulphur sprays was unimpaired after two days' standing.

Practical observations have demonstrated the superior efficiency of slow-drying sulphur sprays, applied in the evening or under an overcast sky, over treatments

made during the heat of the day and followed by rapid desiccation. Electron-microscope photographs revealed the scientific basis of these differences in fungicidal activity. The rapidly drying deposits were granular, with few 'threads' (which are presumed to confer adhesive and rain-resistant properties), whereas in the slow-drying residues 'threads' were predominant.

The observed adverse effects on sulphur sprays of an admixture of soaps or wetters were also explained from electron-microscope preparations. During the final phase of even slow desiccation the short, round ultra-sulphur particles aggregated into a crust without 'threads'. The punctate burns on the leaves frequently resulting at temperatures round about 40° C. from the treatment of vines and fruit trees with sulphur supplemented by a wetter or soap are attributed to the increase of vapour from the dense, closely aggregated accumulations of sulphur.

Simple comparisons of the dimensions of dispersed sulphur particles were found to be inadequate for the assessment of their probable plant-protective properties. Other decisive factors include the proportion and nature of the protective colloid, manufacture, mode and combination of application, and microclimatic conditions.

Hochstein (P. E.) & Cox (C. E.). **Studies on the fungicidal action of N-(trichloromethylthio)-4-cyclohexane-1,2-dicarboximide (captan).**—*Amer. J. Bot.*, 43, 6, pp. 437–441, 5 graphs, 1956.

At Maryland Agricultural Experiment Station it was found that concentrations of captan [cf. *R.A.M.*, 33, p. 614] which inhibited the growth of conidia of *Fusarium 'roseum'*, with the excess accumulation in them of pyruvate, also inhibited the respiration of glucose by the fungus. The metabolism of pyruvate was inhibited under both aerobic and anaerobic conditions. The inhibition of carboxylase from brewer's yeast (*Saccharomyces cerevisiae*), reversed by the addition of cocarboxylase (thiamine pyrophosphate), was thought to result from coenzyme competition.

Although addition of thiamine hydrochloride or cocarboxylase to the medium did not permit growth of *S. cerevisiae* in the presence of captan, the data suggested that interference with decarboxylation reactions requiring thiamine pyrophosphate as a coenzyme may be involved in the inhibition of fungus growth by the fungicide.

Lambermont (F.). **Organic fungicides.**—*Plant Prot. Overseas Rev.*, 4, 4, pp. 136–142, 1955.

In this paper, originally presented at the tenth Congress of Agricultural Industries, Madrid, June, 1954, the author reviews the present position with regard to the development of modern organic fungicides [cf. *R.A.M.*, 35, p. 472]. As it is estimated that over 2,000,000 tons of metallic copper have already been used in viticulture in Europe and North Africa alone, the economic importance of substitutes is evident.

Tamura (H.). **Evaluation of fungicidal activity of organic fungicides. Fungitoxicity of several substituted pyrazoles.**—*Bull. nat. Inst. agric. Sci. Nishigahara*, Ser. C, 5, pp. 1–16, 6 graphs, 1955. [Japanese, with English summary. Received 1956.]

In a comparative study of the toxicity of substituted pyrazoles to spores of *Piricularia oryzae* and *Ophiobolus miyabeanus* in Petri dishes at the National Institute of Agricultural Sciences, Nishigahara, Tokyo, Japan, the most active were 1-phenyl-3,5-dimethyl-4-nitrosopyrazole and 1-(*p*-chlorophenyl)-3,5-dimethyl-4-nitrosopyrazole. Exposed to various conditions out-of-doors and in the laboratory, the latter compound was more stable in its toxicity to *P. oryzae* than the former and the activity of both was unchanged by pH variations from 6 to 10.

Official F.D.A. tolerances listed.—*Nat. agric. Chemic. Ass. News*, 14, 5, pp. 8–15, 1956.

In this further compilation are listed pesticide tolerances for various crops established up to 15th June, 1956, by the Food and Drug Administration of the United States [cf. *R.A.M.*, 35, p. 622]. Pesticides exempt from the requirement of a tolerance when applied to growing crops are also included.

Munger (G. D.). **Sorption and fungitoxicity of radioactive potassium dimethyl- and di-*N*-propyldithiocarbamates.**—*Diss. Abstr.*, 16, 3, pp. 438–439, 1956.

Following reports that sodium dimethyldithiocarbamate [*R.A.M.*, 34, p. 533] was more toxic to *Helminthosporium sativum* [*Cochliobolus sativus*] and *Alternaria oleracea* [*A. brassicicola*] and absorbed to a greater degree than sodium di-*N*-propyldithiocarbamate, the author used the potassium salts, thus eliminating the potential influence of sodium on permeability, in an attempt to relate both adsorption and absorption to fungicidal activity of the two homologues. Spores of *Monilinia* [*Sclerotinia*] *fructicola* were used in preference to those of *A. brassicicola*, having less germination variability, which was also reduced by harvesting the test spores dry. *C. sativus* spores collected from media containing galactose, lactose, and starch were the most resistant to 2×10^{-4} M potassium dimethyldithiocarbamate, a difference attributed to their larger size and explained on a spore volume-toxicant basis. A further source of variability was encountered in the cellulose filter disks, so a new filter apparatus was designed, in which spores were uniformly deposited on a plastic 'millipore' filter and easily removed for radioactivity measurements.

Potassium dimethyldithiocarbamate labelled with radioactive sulphur (S^{35}) [35, p. 471] at 1×10^{-3} M was more fungicidal to spores of both *S. fructicola* and *C. sativus* than the *N*-propyl derivative, but adsorption and absorption of the former compound were significantly lower than of the latter.

Terminologie. [Terminology.]—*Bull. Prot. Vég.* 2, pp. 83–90, 1954.

In November, 1952, a Terminology Commission was set up within the Society of Phytiatry and Phytopharmacy to define exactly the terms concerning the products, materials, and techniques employed in plant protection. The 'Lexicon of terms used in phytopharmacy', published in *Rev. Phytiatrie-Phytopharm.*, 3, 1, 1954, is reproduced herein. The definitions are under the sub-headings (I) general terms, (II) phytopharmaceutical products and preparations, and (III) phytopharmaceutical treatments.

Bärner (J.). **Bibliographie der Pflanzenschutzliteratur 1950.** [Bibliography of plant protection literature 1950.]—438 pp., Berlin, Paul Parey, 1956. [English and French introduction, contents, and page headings.]

The present instalment of the above-mentioned bibliography [cf. *R.A.M.*, 35, p. 113] comprises over 13,300 titles and is compiled on the usual lines. It is proposed to issue the missing volumes from 1946 to 1949, inclusive, in the near future.

Tirelli (M.). **Indici delle rassegne dei casi fitopatologici compilate da L. Petri dal 1926 al 1942. Parte I. Parte II.** [Indexes to the reviews of phytopathological records compiled by L. Petri from 1926 to 1942. Part I. Part II.]—*Ann. Sper. agr.*, N.S., 9, 4, *Suppl.* pp. xxiii–lxi; 5, *Suppl.* pp. xxix–lxv, 1955.

In the first part of the author's index to the plant pest and disease records, including fungal, bacterial, and virus diseases and physiological disorders, contained in the annual reports published by L. Petri from 1926 to 1942 when Director of the Plant Pathology Station, Rome, the records are listed under the hosts, which are arranged alphabetically, mostly under their common names. Against each

entry are shown the date of the relevant report and the number of the page on which the record occurs. All the reports in question were noticed in this *Review* [cf. *R.A.M.*, 25, p. 539].

In the second part the same information is indexed under the Latin name of the causal organism or the Italian name of the disorder. An index to the plant protectants mentioned is also given, with the host on which each was used and the reference.

Silveira (V. D.). **Elementos de fitopatologia. Fascículo X.** [Elements of phytopathology. Fascicle 10.]—*Rev. Agron., Rio de J.*, 12, 1, pp. 5–31, 15 figs., 1953; 13, 2, pp. 99–148, 20 figs., 1954. [Received May, 1956.]

The first instalment of the present fascicle of the writer's treatise on the rudiments of phytopathology [cf. *R.A.M.*, 30, p. 54] contains essential information on the Agaricaceae, including a key for their determination, a list of the species recorded in Brazil, and observations on certain pathogens, e.g., *Omphalia flavida* [*Mycena citricolor*: C.M.I. map No. 9] on coffee and *Marasmius perniciosus* [No. 37] on cacao. The second deals similarly with the Polyporaceae and comprises observations on some wood-destroying species and on various methods of timber preservation. Each section is followed by a bibliography.

Butler (E. E.). **Mycoparasitism by Rhizoctonia solani.**—*Diss. Abstr.*, 16, 4, pp. 622–623, 1956.

Isolates of *Rhizoctonia* [*Corticium*] *solani* parasitic on higher plants were found to be parasitic also on fungi *in vitro*. With the exception of *Ambylosporium botrytis* only phycomycetes were parasitized. Those most susceptible to attack were *Rhizopus nigricans* [*R. stolonifer*], *Syncephalastrum* sp., *Mucor recurvus*, *M. flavus*, *Helicostylum* sp., *Pythium splendens*, *P. debaryanum*, and *P. butleri* [*P. aphanidermatum*].

Various isolates of *C. solani* ranged from highly virulent to avirulent on the fungi. Four physiological races were distinguished on the basis of differential pathogenicity to *P. debaryanum* and *Rhizopus* sp. Various isolates from a given host species differed in their susceptibility to a given isolate of *C. solani*. Thus of ten single sporangium isolates of *R. arrhizus* eight were resistant or slightly susceptible while two were very susceptible. *C. solani* was highly virulent when grown on rice grain but avirulent when grown on water agar. *M. recurvus* was parasitized only when both it and the parasite were supplied with a hexose or a di- or polysaccharide with hexose groups. With pentose sugars as the source of carbon, infection was very sparse or absent. On potato dextrose agar *M. recurvus* was susceptible at 25° and 30° C., slightly susceptible at 20° and immune at 15°.

White light at 150 to 400 foot-candles inhibited infection of *Rhizopus* sp., *M. recurvus*, *P. debaryanum*, and *P. aphanidermatum*. The last two were most susceptible in the pH range 5·5 to 7·1, and *Rhizopus* sp. in the range 6·7 to 7·1.

Maramorosch (K.). **Semiautomatic equipment for injecting insects with measured amounts of liquids containing viruses or toxic substances.**—*Phytopathology*, 46, 4, pp. 188–190, 1 diag., 1956.

From the Rockefeller Institute for Medical Research, New York, the author describes a quantitative method for the experimental transmission of plant viruses to insect vectors, for which the following equipment is required: a Pyrex glass micropipette, 120 to 150 mm. in length with a fine capillary tip, prepared by Black and Brakke's technique [*R.A.M.*, 32, p. 22]; rigid rubber or polythene tubing to connect the pipette with a pulsating pump (Thiborg aquarium aerator Model No. 1), used to force the inoculum into the insect's body, and an electric time switch to operate it; a bottle of carbon dioxide connected with a Buchner funnel to serve

as a chamber for continuous anaesthesia (*Science*, 103, p. 57, 1946); and a dissecting microscope.

GREGORY (F. J.). **Studies on the actinomycins with emphasis on actinomycin D.**—*Diss. Abstr.*, 16, 2, p. 209, 1956.

At Rutgers University the chemical composition of an antimycin produced by a new species of *Streptomyces*, *S. parvullus*, on 2 per cent. soya-peptone and 1 per cent. glucose was investigated and designated antimycin D. On the basis of comparative studies on acid and alkaline hydrolysis and aerial oxidation the known antimycins [cf. *R.A.M.*, 35, p. 625] were divided into five major groups.

ASHCROFT (J. M.) & BAGDON (V. J.). **A rot-proof military sandbag.**—*Amer. Dyest. Reptr*, 45, 17, pp. 541–542, 579, 3 figs., 1956.

Investigations are now in progress, in co-operation with representatives of industry, at the Engineer Research and Development Laboratories, Fort Belvoir, Virginia, on the feasibility of producing a rot-proof sandbag at an over-all cost which would be competitive with any available substitute for jute burlap. Of the materials so far tested, the most promising type is some form of modified cellulose. Partially acetylated cotton osnaburg bags have withstood five years' exposure to exacting conditions for decay at Fort Belvoir and two years under the influence of solar radiation at Yuma, Arizona, without loss of serviceability. At present, however, the material fails to meet two essential requirements—availability and reasonable cost.

WHITEHOUSE (JILL A.). **Apparent mildewing of new bookbindings.**—*Aust. J. Sci.*, 18, 2, pp. 60–61, 2 figs., 1955.

Rapid deterioration of the new bindings of library books is reported from the Faculty of Agriculture and Department of Botany, University of Sydney, New South Wales, pocked and discoloured patches spreading from (? *Penicillium crustosum*) the edges to the centre of the cover within three or four days. The fungus isolated from the affected material induced similar effects on a sample of the cover immersed in agar but not under the same conditions of temperature and humidity as those prevailing in the library, unless the sample was actually maintained within the latter itself.

Following the application of salicylanilide to the covers and its incorporation into the binder's glue, the damage continued to occur in the form of a heavier and more irregular pocking than that observed in the first instance. Separate fumigation of the library and books prevented any fresh damage for about two months, after which the same irregular pocking and discoloration again developed. At this stage no fungus could be isolated from the affected areas.

A nocturnal inspection of the library revealed cockroaches feeding on the sizing between the cellulose fibres of the covers and causing a disfiguration identical in extent and nature with the second form mentioned above. It is believed that the insects were responsible for the initiation of the deterioration and acted as vectors of the mould, which in turn was concerned in the regular spread of the symptoms. After eradication of the fungus by the fungicidal treatment, cockroaches appear to have been the exclusive cause of further trouble.

ŁANOWSKA (H.). **Wstępne badania nad wpływem środowiska na występowanie mikoryzy u Ziemniaka.** [Preliminary studies on the influence of the environment on the appearance of mycorrhiza in Potato plants.]—*Acta microbiol. polonica*, 4, 4, pp. 265–270, 2 figs., 1955. [Russian and English summaries.]

Results of the preliminary studies, carried out at Puławy, Poland, to determine whether and under what conditions mycorrhiza develop on potato roots [cf. *R.A.M.*,

31, p. 396] showed that they were present on all potato plants in ploughed fields and absent from or morphologically different in those growing in forest soil for three years. Mycorrhizal development was most pronounced in plants transferred every year to a new field.

HARLEY (J. L.) & WAID (J. S.). **The effect of light upon the roots of Beech and its surface population.**—*Plant & Soil*, 7, 1, pp. 96–112, 2 graphs, 1955.

During 1953 experiments at the Botany Department, Oxford University, determined the effect of varying daylight intensities on the fungus flora on the root surfaces of beech seedlings during the first year of growth, using a sampling technique already described [*R.A.M.*, 35, p. 34]. The first mycorrhizal infections were not observed until after the unfurling of the first pair of true leaves, but even then plants in the most light showed the greatest vigour. The most abundant type of mycorrhiza were light brown and similar to those commonly found on beech in the humus layers of the woodland soil, some of which was used in the experiment. Infection by the black mycorrhizal fungus *Cenococcum graniforme* was observed in abundance on all plants receiving more than 10·6 per cent. daylight. Those mycorrhiza which are found on mature beech in woodlands were most abundant on seedlings grown in 25 per cent. daylight, less in 14 per cent., and absent from those in 10·6 per cent. Parasitic infections of *Rhizoctonia sylvestris* and *Mycelium radicis atrovirens* were found on the roots of seedlings growing in the lowest light intensity, 3·6 per cent. daylight. *Rhizoctonia* was very abundant on the roots of heavily shaded plants in July, but less so by September, due either to the condition of the host plant or to the influence of antagonistic organisms. This decline was not explained by a corresponding increase in *Trichoderma viride*, a common antagonist of *Rhizoctonia*.

It is concluded that the condition of the host plant is of primary importance in the determination of the root surface microflora; but the effects of interaction between these microfungi require further elucidation.

In another series of pot experiments it was shown that the conditions influencing seedling growth, especially the nature of initial infection, exerted a lasting influence over the subsequent growth and development of the trees. Beech seedlings grown in nursery soil containing large numbers of soil-borne pathogens were less vigorous than those which had grown in woodland soil from mature beech stands and had developed normal mycorrhiza.

SCHÜTTE (K. H.). **Translocation in the fungi.**—*New Phytol.*, 55, 2, pp. 164–182, 3 figs., 2 graphs, 1956.

At the Botany Department, University College, Dublin, it was shown that some common mould fungi, including *Rhizopus oryzae* and *R. nigricans* [*R. stolonifer*] were capable of translocating sugar, nitrogen, phosphorus, and fluorescein, while a second group, typified by *Aspergillus niger*, was incapable of translocating any of these compounds. The ability of moulds to translocate was tested by growing them on a complete nutrient agar filling a Petri dish placed inside a larger Pyrex dish filled to the same level with an agar deficient in the compound under investigation. If the fungus was unable to grow normally over the dividing narrow glass rim and on to the deficient agar then it was concluded to be unable to translocate the essential nutrient from the centre dish. Chemical tests and those using fluorescein supported results obtained by this method.

Translocation was also shown to occur in all agarics. *Armillaria mellea* and *Collybia velutipes* were tested in culture, while a large number of mature agaric fructifications absorbed and translocated dyes in distinct translocating zones which did not differ morphologically from surrounding tissue. In the field, when the mycelial area inside fairy rings of *Tricholoma* sp., *Amanita* sp., *Marasmius oreades*,

Clitocybe sp., and *Mycena elegans* were watered with a dye solution, within a few hours the dye appeared in the fructifications on the edge of the ring. Translocation did not occur in the reverse direction, i.e., from the edge of the ring towards the centre.

Mizumoto (S.). **Studies on Lenzites abietina Fr. and some of its allied species. III. Comparison of cellulose-decomposition by Lenzites abietina, L. subferruginea, L. trabea, and L. saepiaria.**—*J. Jap. For. Soc.*, 37, 5, pp. 187–191, 1955. [Japanese, with English summary. Abs. in *Biol. Abstr.*, 30, 6, p. 1741, 1956.]

Cultured in mineral solution or potato extract, *Lenzites trabea* decomposed cellulose (supplied as filter paper), whereas *L. abietina*, *L. subferruginea*, and *L. saepiaria* did not. All these fungi decomposed colloidal cellulose in media. *L. abietina* Nos. 3 and 4 and *L. subferruginea* No. 5 decomposed cellulose actively, and *L. trabea* No. 3 did so weakly. Ability to decompose cellulose appeared to parallel virulence in *L. subferruginea*, *L. trabea*, and *L. saepiaria*, but not in *L. abietina*.

Gersdorf (E.). **Besteht zwischen dem Vorhandensein der Winterwirte virusübertragender Blattläuse und dem Auftreten der von ihnen übertragenen Viren eine Beziehung?** [Is there a connexion between the existence of the winter hosts of virus-transmitting aphids and the occurrence of the viruses transmitted by them?] –*Höfchen-Briefe*, 8, pp. 194–218, 1955. [Abs. in *Z. PflKrankh.*, 63, 6, pp. 349–350, 1956.]

The overwintering of *Myzodes* [*Myzus*] *persicae* (the principal vector of potato viruses) in the egg stage on peach is considered to be of minor importance in the mass migration to its summer hosts, at any rate in the 'seed'-producing region of northern Hanover, where extensive oviposition is a rarity [cf. *R.A.M.*, 30, p. 241]. The influx of winged forms from parts of the country where peaches are widely cultivated is regarded as the decisive factor in colonization. Of negligible significance locally is the overwintering of alates in greenhouses and cellars, while wind direction was also found to be without influence on the movement of *M. persicae* from 'degeneration areas'. The writer is concerned, however, at the increase of aphid overwintering in the egg stage on *Prunus serotina*, an introduction from the United States popular among foresters.

Böning (K.) & Diercks (R.). **Versuche über den Einfluß der Mineralsalzernährung auf die Empfänglichkeit der Kartoffelpflanze für Blattroll- und Strichelkrankheit.** [Experiments on the influence of mineral salt nutrition on the susceptibility of the Potato plant to leaf roll and streak disease.]—*Bayer. landw. Jb.*, 32, pp. 276–323, 1955. [Abs. in *Z. PflKrankh.*, 63, 6, p. 347, 1956.]

The results of experiments in Bavaria confirmed previous observations as to the adverse influence of chloride-containing fertilizers on the incidence and severity of potato leaf roll virus and [unspecified] streak [cf. *R.A.M.*, 32, p. 273; 33, p. 497]. Similar effects followed the excessive use of sulphates. The symptoms were enhanced by nitrogen deficiency and excess of potassium; of the anions, chloride intensified and sulphate weakened the expression of the viruses. Excess of lime and unduly heavy applications of nitrogen also resulted in masking of the symptoms. At the same time the latter treatment led to extensive infection of the progeny, the persistence of which for many years may be accompanied by a loss of the aptitude for masking.

The favourable influence frequently exerted by excess lime on the health of the crop is attributed to the cell-physiological action of the anions on the plasma colloids. The calcium ion thickens the colloid, thereby restraining the motility of the virus particles, while chloride produces a diametrically opposite effect and thus

promotes their dispersal. Furthermore, excessive nitrogen soil amendments prolong the particularly susceptible juvenile phase of the host, while potassium deficiency confers a measure of resistance by accelerating the advent of maturity.

On the basis of these investigations it is recommended that chloride-containing fertilizers should not be applied in potato cultivation, while both nitrogen and potassium should be sparingly used on crops intended for 'seed'. On the other hand, nitrogen may be applied freely to increase the yields of crops that have degenerated too far to produce good-quality 'seed'. However, further propagation from such stocks should be discontinued immediately [cf. 29, p. 225].

HENKE (O.). **Beitrag zum N-Stoffwechsel blattrollkranker Kartoffelpflanzen.** [Contribution to the N-metabolism of leaf roll-diseased Potato plants.]—*Zbl. Bakt.*, Abt. 2, 109, 13–19, pp. 367–388, 9 graphs, 1956.

At the Biological Institute, Naumburg a.d. Saale, the influence of the leaf roll virus on the nitrogen metabolism of Mittelfrühe and Ackersegen potatoes [cf. *R.A.M.*, 10, p. 332] was investigated. Analyses during the emergence period revealed an obstruction in the transport of nitrogen from infected tubers to the young sprouts. Particularly remarkable was the high nitrate content in diseased mother tubers of the Ackersegen variety, amounting in some cases to 10 times that of healthy ones. Consequent on the condition of the infected mother tubers, the sprouts arising from them showed abnormally low total and protein nitrogen contents, the latter amounting in Mittelfrühe and Ackersegen to only one-fifth and one-half, respectively, of that of healthy material. In general, the leaves of diseased Mittelfrühe also contained less total and protein, and more soluble nitrogen than those of healthy plants, with a striking increase of nitrate in the former. The protein nitrogen content was also lower in diseased than in healthy Ackersegen leaves, but in this variety the increase in soluble nitrogen resulting from leaf roll was so heavy that the total amounts were almost equal in healthy and infected material. The nitrate content of the diseased leaves was even lower, in relation to that of healthy ones, in Ackersegen than in Mittelfrühe.

During the growing period an increase of total nitrogen was demonstrated in most of the tubers produced by infected plants. It was due to their consistently higher protein content; there were no clear-cut differences in the amounts of soluble nitrogen between healthy and diseased tubers. The rise in total and protein nitrogen in the latter was maintained during storage [cf. 29, p. 528].

Reduced hydrolysability of the protein of diseased tubers in response to the application of digestive enzymes (trypsin, pancreatin, and papayotin-Merck) was demonstrated in some experiments.

WENZL (H.). **Sommeranbau als Maßnahme gegen Abbau durch knollenübertragbare Kartoffelviren und gegen Fadenkeimigkeitsabbau.** [Summer cultivation as a precaution against degeneration from tuber-transmissible Potato viruses and against spindle-sprout degeneration.]—*Bodenkultur*, 8, 3, pp. 274–306, 1955.

A comprehensive survey of information contained in 70 contributions to the literature on the importance of the season of potato cultivation in relation to 'seed' quality and yield, with special reference to summer cultivation in south-eastern Europe [cf. *R.A.M.*, 15, p. 599; 33, p. 373; 34, p. 389, *et passim*], is followed by a tabulated account of experiments covering the period from 1951 to 1954 in the arid zone of eastern Austria to determine the effect of this factor on the incidence of tuber-transmissible viruses, wilt (*Colletotrichum atramentarium*), and spindle sprout [35, p. 540]. Some of the results have already been published [32, p. 692; 35, p. 226].

In general, May- and June-planted crops sustained particularly severe damage

from leaf roll and other viroses, which were considerably less prevalent in stands planted at the customary time (first half of April) and least important in July plantings. The frequency of *C. atramentarium* in April- and May-planted crops was about equal, but the wilt symptoms appeared somewhat earlier in the former. In June plantings the amount of infection was slight and in those of July negligible. In medium-early and late varieties the occurrence of spindle sprout is correlated with that of wilt.

Under the present experimental conditions, in soils of a very unfavourable moisture-level and mostly extreme summer drought with no irrigation, production fell progressively with delay in planting and the July-planted crops gave only a low yield, with relatively small tubers. The disadvantage of late planting (which would otherwise be of interest from the standpoint of virus and spindle sprout control) is further accentuated by the risk of October frosts. Hence it is recommended that the usual method of planting early in April [cf. 35, p. 117] should, in general, continue to be practised in the environs of Vienna.

TOMIYAMA (K.), TAKASE (N.), SAKAI (R.), & TAKAKUWA (M.). **Physiological studies on the defence reaction of Potato plant to the infection by Phytophthora infestans. II. Changes in the physiology of Potato tuber induced by the infection of the different strains of P. infestans.**—*Ann. phytopath. Soc. Japan*, 20, 2–3, pp. 59–64, 1 fig., 1955. [Japanese, with English summary. Received 1956.]

Following the suggestion made in Part I of this series that an acceleration of protein synthesis accompanies the reaction of resistant potato varieties to infection by *Phytophthora infestans*, cut tubers of the variety Hokkai No. 10 were inoculated with zoospore suspensions of two strains of the fungus, H_1 and H_2, to which the variety was highly resistant, and with H_3 and H_7, to which it was susceptible. In tissue infected with H_1 and H_2 a considerable increase in oxygen uptake occurred ten to 35 hours after inoculation, accompanied by an increase in water-soluble protein nitrogen and polyphenol content, but not in tissue inoculated with H_3 and H_7.

TOMIYAMA (K.). **Cytological studies on resistance of Potato plants to Phytophthora infestans. II. The death of the intracellular hyphae in the hypersensitive cell.**—*Ann. phytopath. Soc. Japan*, 19, 3–4, pp. 149–154, 1 fig., 1955. [Japanese, with English summary.]

Observations were made on tissue stripped by razor from the midrib epidermis of the resistant potato hybrid 41089–8 inoculated with *Phytophthora infestans*, staining with neutral red or plasmolysis with sucrose being used to ascertain when the host cell and intracellular hyphae died. If the sections are taken when the parasitized cells still appear normal, or, if discoloured, still show Brownian movement (four to eight hours after inoculation), the intracellular hyphae survive for 30 to 50 (maximum 90) hours after inoculation and spread into the surrounding tissues. In sections taken when the cells are yellow or pale brown, but Brownian movement has ceased, about half the intracellular hyphae are alive and subsist for 30 to 50 hours after inoculation but cannot penetrate further in the cell, though, if touching the cell wall, they may grow towards neighbouring cells still showing Brownian movement. It is assumed, therefore, that the growth of these hyphae has been mechanically inhibited by gelation of the host cell contents. If the invaded cells had turned blackish-brown before sectioning no intracellular hyphae were found alive, but the surrounding tissues survived for one to two days.

Sections in which the invaded cells showed the initial changes were exposed on agar in a Petri dish for 22 to 23 hours. The parasitized cells were discoloured, but did not become brown, and the intracellular hyphae survived a long time, showing

the inhibition of browning to be due not to lack of oxygen but to loss of active vital function. It was also shown that an increase of phenol compounds and activation of nitrogen metabolism occurred in cells adjoining those penetrated by *P. infestans*. It seems that during browning the continuous deposition of these substances results in gelation of the cell contents, sealing up and killing the hyphae, and that the active vital function may be related to these processes.

RÖNNEBECK (W.). **Ein phytotoxisches Prinzip aus Phytophthora infestans de By.** [A phytotoxic principle from *Phytophthora infestans* de By.]—*Z. PflKrankh.*, 63, 7, pp. 385–389, 5 figs., 1956. [English summary.]

At the Justus Liebig Institute, Giessen, Germany, *Phytophthora infestans* has been found to grow rapidly and well on a medium consisting of 10 gm. beet sugar, 100 ml. filtered pea juice (from green, unripe peas), 15 gm. agar, and sufficient twice-distilled water to make up to 1,000 ml., sterilized for 30 minutes at 0·75 atm. The culture filtrate contains a toxic principle which induced necrosis in the leaves of Erstling [Duke of York] potato plants inoculated by vacuum infiltration. The toxin was also demonstrated after nine months' storage in the protein of the culture filtrate by salting out with ammonium sulphate.

The fact that the fungus loses its capacity for zoospore production on pea juice agar was of no importance in relation to the present studies. In any case, sporangia which liberated infective zoospores could readily be obtained on the medium by placing slices of potato tubers or green tomato fruits on plates colonized by the fungus.

HILDEBRAND (E. M.). **Mechanical transmission of Sweetpotato internal cork virus aided by cysteine.**—*Phytopathology*, 46, 4, pp. 233–234, 1 fig., 1956.

Of four reducing chemicals tested at the Plant Industry Station, Beltsville, Maryland, for their ability to protect the internal cork virus of sweet potato from rapid inactivation, cysteine and sodium sulphite were the most effective, the former also facilitating mechanical transmission to Scarlett O'Hara morning glory [*Ipomoea bona-nox* × *I. hederacea*: *R.A.M.*, 35, p. 632]. Thus, when root or leaf tissues of diseased sweet potato plants were ground with an admixture of 0·08 M. cysteine and rubbed on *I. purpurea* leaves moistened with 1 per cent. potassium dihydrogen phosphate and dusted with carborundum, veinbanding mottle symptoms developed within nine days. 'Tissue-squeeze' rubbing [loc. cit.] proved to be a very reliable indexing method for checking the results obtained with the cysteine technique.

Preliminary observations on several properties of the virus were made with the aid of the stabilizer. For instance, active virus was shown to be present in sediment from centrifuging at 2,000, 8,000, and 20,000 r.p.m. Infectivity appeared to be lost at dilutions slightly above 1:2 but under 1:10. At greenhouse temperatures of about 30° C. virus extracts containing 1, 0·1, or 0·01 per cent. cysteine retained activity for three hours at the most, whereas several preparations held at 6° were still active after 26 hours. In one series of tests a mixture of equal volumes of 1 per cent. cysteine and virus extract was active after one minute's exposure at 60° but not after two minutes. The virus survived five but not 10 minutes at 55°. The thermal inactivation point in hot-water immersion tests was 56° for diseased petiole tissues, 55° for the root, and 54° for the leaf.

MISAWA (T.) & KATO (S.). **Physiology of the causal fungi of stem rot of Rice plant. II. On the growth factors.**—*Ann. phytopath. Soc. Japan*, 20, 2–3, pp. 65–70, 1955. [Japanese, with English summary. Received 1956.]

In a further contribution to this series [cf. *R.A.M.*, 35, p. 790] it was shown that biotin and thiamine are essential for the growth of the rice stem rot fungi, *Leptosphaeria salvinii* and *Helminthosporium sigmoideum* var. *irregulare*.

KAMATA (E.). **Relationship between iron, manganese, zinc, and copper contents in Rice plant and its resistance to the wilting disease (Piricularia oryzae).**—*Proc. Crop. Sci. Soc. Japan*, 23, pp. 281–282, 1955. [Abs. in *Rec. Res. Fac. Agric. Univ. Tokyo* 5, p. 2, 1956.]

The resistance of rice plants to *Piricularia oryzae* [*R.A.M.*, 35, p. 40] was increased by high concentrations of iron, manganese, zinc, and copper in the leaf, but was not influenced by nitrogen, magnesium, calcium, or silica.

HENKENS (C. H.). **Enkele resultaten van onderzoek over de sporenelementen molybdeen en mangaan.** [Some results of an investigation on the trace elements molybdenum and manganese.]—*Landbouwk. Tijdschr.*, 68, 1, pp. 109–112, 1 fig., 3 graphs, 1956.

Increases in the yield of beet and cauliflower suffering from molybdenum deficiency in sandy soils with a high iron content intersected by rivulets in Holland [*R.A.M.*, 31, p. 96], obtained by amendments of sodium molybdate, ranged from 27 to 200 and 100 to 600 per cent., respectively.

Symptoms of the deficiency in beet [32, p. 600] become apparent at a very early stage, the first leaves turning pale and chlorosis ensuing in severe cases. The plants are stunted and the leaves stiff, with a tendency to fold along the main veins. The colour improves as the season advances, but the plants do not recover from the initial set-back. The amount of sodium molybdate to effect a cure should not exceed 1 to 2 kg. per ha.

The results of chemical analyses indicated that manganese deficiency affects beet [33, p. 132] and cereals [33, p. 103] on both sandy and clay soils with a humus content below 2·5 per cent. when less than 60 kg. reducible manganese per ha. is available. The most effective control in winter wheat in 1954 was obtained by an initial spray of 1·5 per cent. manganese sulphate at the rate of 1,000 l. per ha. on 6th May, when the symptoms were clearly visible, followed by a second on 9th June; where the latter was omitted the yield was 400 kg. per ha. less. When the chemical was added to the soil (50 kg. per ha.) on the same date the yield was 800 kg. per ha. lower than with two sprays.

THOMAS (C. A.) & WEBB (R. E.). **Peppermint wilt induced by a Verticillium isolate from Potato.**—*Phytopathology*, 46, 4, p. 238, 1956.

At the Agricultural Research Service, Beltsville, Maryland, three out of seven isolates of *Verticillium albo-atrum*, two from peppermint in Indiana and one from Katahdin potato in Maine, proved to be pathogenic in inoculation tests on Mitcham peppermint plants [*R.A.M.*, 34, p. 63] grown in steamed soil from rooted cuttings at a mean temperature of 21° C., inducing wilt symptoms within a month.

However, in the plants inoculated with material from potato the disease was relatively mild with a tendency to spontaneous recovery. The potato isolate was pathogenic to its own host and also to tomato, which reacted negatively to tests with inoculum from peppermint. The potato and peppermint isolates were recovered without loss of virulence from the inoculated peppermint plants at heights of 6 and 10 in., respectively, above soil-level.

This is believed to be the first report of an isolate of *V. albo-atrum* pathogenic to the three hosts under observation.

Twentieth and twenty-first Annual Reports of the British West Indies Central Sugar Cane Breeding Station, Barbados, for the years ending September 30th, 1953 and 1954.—68 pp., [? 1955], 53 pp., [? 1956].

In the first of these reports [cf. *R.A.M.*, 29, p. 121] it is noted (p. 53) that Dr. Steindl found symptoms suggestive of ratoon stunting [see following abstracts] on

most of the commercial sugar-cane varieties in Barbados, but not on B 37161, and recommended the establishment of clean nurseries.

Arising from visits to Jamaica in connexion with the Sugar Technologists' Congress [35, p. 633] and from the co-operation of Dr. Abbott in the United States (p. 58), it was found that the variety B 4362 is immune from all the Louisiana sugar-cane mosaic virus strains. B 42231 has proved mosaic-resistant in Jamaica. In some areas in Jamaica the attacks of *Helminthosporium* leaf spot [*H. sacchari*] are such as to require attention to resistance in selecting sugar-cane varieties for cultivation.

In the second report it is noted (p. 33) that B 41227 is particularly susceptible to damage by heat treatment for ratoon stunting [35, p. 549]. Reference is made (p. 37) to the change in varieties cultivated in British Guiana as a result of leaf scald [*Xanthomonas albilineans*: 35, p. 720].

In Jamaica B 37172 is severely affected by chlorotic streak virus, B 41227 is also susceptible, and B 4362 may have to be withdrawn from cultivation on account of its susceptibility to mosaic and chlorotic streak viruses, red rot [*Glomerella tucumanensis*], mottled stripe [*X. rubrisubalbicans*: 34, p. 518], and *Fusarium* top rot [*Gibberella fujikuroi*].

Hughes (C. G.) & Steindl (D. R. L.). **Ratoon stunting disease of Sugar Cane.**—*Tech. Commun. Bur. Sug. Exp. Stas Qd, 1955*, 2, 54 pp., 1 col. pl., 19 figs., 1955.

Most of the information in this comprehensive account of ratoon stunting disease of sugar-cane, its symptoms, cause, and control, with particular reference to its occurrence in Queensland, has already been noticed [*R.A.M.*, 35, p. 634]. Amongst countries in which the disease has been observed [C.M.I. map No. 318 and preceding and following abstracts] are Jamaica, St. Kitts, Antigua, and Trinidad in the British West Indies, Colombia, Formosa, Mexico, Puerto Rico [*R.A.M.*, 35, p. 43], the Philippines and Nicaragua. Symptoms have been seen on canes received from the United States Department of Agriculture's Station in Florida, and from India, but the disease does not appear to occur in New Guinea.

Attention is drawn to the difficulty of distinguishing stunting due to this disease from that brought about by other factors, and diagnostic colour symptoms [35, p. 328] are fully described, with reference to their variation, and possible confusion with those caused by chlorotic streak. The disease does not appear to spread rapidly without the agency of man. Cross-inoculations have shown that ratoon stunting is not due to any of the well-known plant viruses, but it is considered that this disease may have accounted for the deterioration of certain major sugar-cane varieties in the past, a degree of tolerance in them having masked visible stunting. A bibliography of 63 references is appended.

Diseases.—*Rep. Hawaiian Sug. Exp. Sta., 1955*, pp. 17–20, 1 fig., 1 graph, 1955.

It is stated in this report [cf. *R.A.M.*, 34, p. 676], which covers the period 1st October, 1954, to 30th September, 1955, that commercial clorox [sodium hypochlorite] gave better control of knife transmission of sugar-cane ratoon stunting disease than 10 per cent. lysol [see next abstract]. A test to measure sugar losses in cane planted from cuttings inoculated with infected sap showed no significant losses in the varieties 32–8560, 37–1933, 38–2915, and 44–3098 harvested after 26 months. The variety 47–2060 appears tolerant of the disease, cane from diseased cuttings giving similar yields whether heat treated or not, but in a similar trial with 47–4991 heat treatment increased the yield markedly.

Cane diseases.—*Rep. Sug. Ind. Res. Inst., Mauritius, 1955*, pp. 44–58, 3 figs., 3 graphs, [? 1956].

In this report [cf. *R.A.M.*, 35, p. 329] R. Antoine notes that ratoon stunting

disease of sugar-cane tends to occur more in the wettest areas, where the variety M. 134/32 is severely affected, reduction of yield up to 30·6 per cent. being recorded, though diseased cuttings from such areas may give rise to normal growth (despite the presence of the internal symptoms) in drier areas. Ebène 1/37 appears to be less affected in wet localities. Immersion and scrubbing of cane-cutting knives for 15 seconds in mirrol or zephirol (containing 0·5 per cent. of the active substance), after washing in water, is recommended [see preceding abstract].

D. H. Parish reports investigation of the possible detection of ratoon stunting infection by chromatographic methods, which had given some promise, but had not yet yielded consistent results.

Studying chlorotic streak virus, R. Antoine notes that sugar-cane derived from cuttings treated in hot water at 52° C. for 20 minutes might develop 25 per cent. secondary infection in six months and 50 per cent. in 12, but no vector has yet been found. Results suggested possible soil-borne rather than aerial transmission of the disease.

Red stripe [*Xanthomonas rubrilineans*: 35, p. 750] was seen on B. 3337, B. 37161, B. 37172, and once on Ebène 1/37, but the symptoms were very mild and tended to disappear as the plants matured.

Until further experiments have been performed on the deterioration of mercurial fungicides in hot water tanks it is recommended that cuttings should be protected against soil micro-organisms by dipping in cold mercurial solutions immediately after hot water treatment.

E. Rochecouste found that where phytosanitary measures require the killing of sugar-cane plants *in situ* this can be effected by close cutting, chopping the stumps with a knife, and spraying them with TCA [trichlor-acetic acid], 150 gm. to 2 l. water for a 10 ft. row (approximately 30 gm. TCA per stool). The cut canes should be thoroughly sprayed with 15 per cent. emulsifiable pentachlorophenol emulsion at 2 gals. in 45 gals. water.

Ellett (C. W.). **The parasitic fungi of Ohio plants.**—*Diss. Abstr.*, 16, 4, p. 639, 1956.

This register of the parasitic fungi of Ohio, compiled from existing records, herbarium material, and original observations, comprises 983 species and varieties of fungi and bacteria, with over 2,100 host-parasite combinations. It includes 43 first records of fungal species in the State and 72 new host records.

Cooke (W. B.). **Fungi of Mount Shasta. (1936–1951).**—*Sydowia*, 9, 1–6, pp. 94–215, 1955.

Included in this copiously annotated and comprehensive list of the fungi of Mount Shasta, California [*R.A.M.*, 22, p. 498; cf. 32, p. 512], are notes on the vegetation zones of the mountain and a host index.

Pavgi (M. S.) & Thirumalachar (M. J.). **Notes on some Indian Ustilagineae. VIII.**—*Sydowia*, 9, 1–6, pp. 89–93, 2 pl., 1955.

Among the nine smuts listed with critical annotations in this further contribution to the current series [cf. *R.A.M.*, 32, p. 103], besides two new species and a new combination, may be mentioned *Sphacelotheca schweinfurthiana* var. *minor*, destroying the ovaries of *Saccharum munja* [cf. 22, p. 454].

Salam (M. A.) & Ramachar (P.). **Additions to our knowledge of rusts of Hyderabad —II.**—*J. Indian bot. Soc.*, 35, 2, pp. 152–157, 6 figs., 1956.

The authors give an annotated list of 16 species of Uredinales, mostly from the Narsapur Forest Reserve, Hyderabad [cf. *R.A.M.*, 35, p. 126], two of them being new.

Govindu (H. C.) & Thirumalachar (M. J.). **Notes on some Indian Cercosporae. VI.**—*Sydowia*, 9, 1–6, pp. 221–228, 4 pl., 1955.

Included in this further contribution to the current series [*R.A.M.*, 34, p. 400] are *Cercospora medicaginis* on lucerne, *C. cheiranthi* var. *brassicae* n. var. on mustard, with shorter conidia (13 to 38 μ) than the species, *C. caracasensis* on *Anona* [*Anonna*] *squamosa*, all from Bangalore, and *C. subsessilis* [19, p. 692] on *Swietenia mahogoni* from Calcutta, together with seven new species and two other new varieties.

Domański (S.). **Grzyby kapeluszowe (Aphyllophorales, Agaricales) zebrane w Wielkopolskim Parku Narodowym w latach 1948–1952.** [Cap fungi (Aphyllophorales, Agaricales) collected in the Great Polish National Park in the years 1948–1952.]—*Prace Przy. wielkopolsk. Parku nar. Pozn.*, 2, 11, 47 pp., 5 figs., 1955. [Russian and English summaries.]

This is a briefly annotated list of 318 species, nearly all Agaricales, collected mostly in the forest region of Jeziory and partly in those of Górka and Puszczykowo, Poland.

Tubaki (K.). **Studies on the Japanese Hyphomycetes (II) fungicolous group.**—*Nagaoa* (*Mycol. J. Nagao Inst.*), 5, pp. 11–40, 4 pl., 14 figs., 1955. [Received 1956.]

In further studies in this series [*R.A.M.*, 34, p. 753] descriptions and illustrations are given of 23 hyphomycetes isolated from basidiomycete fructifications in Japan. There are three new species and two new combinations. The nutritional requirements of these isolates were briefly investigated.

Subramanian (C. V.) & Ramakrishnan (K.). **On the genus Amphichaeta McAlpine.**—*J. Indian bot. Soc.*, 35, 2, pp. 226–232, 2 figs., 1956.

Following a study at the University Botany Laboratory, Madras, of type material of *Cryptostictis hysterioides*, the type species of the genus, and of *Amphichaeta* (type *A. devesiae*) the authors conclude that the species are congeneric. *Amphichaeta* is antedated by and reduced to synonymy with *Cryptostictis*. *C.* (*A.*) *devesiae*, *C.* (*A.*) *kennedyae*, and *C.* (*A.*) *grevilleae* [*R.A.M.*, 29, p. 511] are the new combinations made following examination of type material.

Moreau (C.) & Moreau (Mireille). **Examen comparatif du mycélium et des sclérotes chez diverses souches du Rhizoctonia solani Kühn et du Morchella hortensis Boud.** [A comparative examination of the mycelium and sclerotia of various strains of *Rhizoctonia solani* Kühn and *Morchella hortensis* Boud.]—*Bull. Soc. bot. Fr.*, 103, 3–4, pp. 117–120, 2 figs., 1956.

In both *Rhizoctonia* [*Corticium*] *solani* (strains from infected carnations and potato tubers in France) and *Morchella hortensis* (from sowings of spores or the tissue of the fungus from the Natural History Museum [Paris]) the mycelium is hyaline or yellowish-grey, 5 to 15 μ in diameter, and constricted at the points of branching, which are remote from the septa. The septa are thickened or the hyphae are enlarged there; clamp-connexions and internal proliferations are frequent; the mycelium is often articulated, and the hyphae sometimes break at the septa, the articulations thus isolated behaving as arthrospores and germinating.

In other respects the fungi differ. In *C. solani* hyphae are usually abundant on the surface of the medium, and pyramid-shaped crystals occur among them. In *M. hortensis* the aerial mycelium is more abundant, and the hyphal wall is thicker, more deeply coloured, and tends to be finely echinulated. Some strains of *C. solani*, however, form a more abundant aerial mycelium, and some strains of *M. hortensis* form mycelium only on the surface of the medium.

In cultures a few days old the rather larger hyphae of both fungi become septate, form dolioform articulations, and branch. They become intertwined and develop into sclerotial masses, at first yellowish, later pale brown. The sclerotia of the two are very similar, but microscopic examination showed that whereas the hyphae remain visible in the wall of those of *C. solani* [cf. *R.A.M.*, 34, p. 262], in *M. hortensis* they are rapidly replaced by a mass of isodiametrical spores. The sclerotia of *C. solani* are darker and have an insipid taste, in contrast to those of *M. hortensis*, which have a pleasant flavour and a delicate, mushroom-like odour.

The similarity of two such different fungi emphasizes the danger of attempting to identify fungi, particularly plant pathogens, by the mycelium only.

Dennis (R. W. G.). **A revision of the British Helotiaceae in the Herbarium of the Royal Botanic Gardens, Kew, with notes on related European species.**—*Mycol. Pap. Commonw. Mycol. Inst.* 62, 216 pp., 1 pl., 179 figs., 1956.

The classification by Nannfeldt of the Helotiaceae is adopted with some modification, for the author's second mycological paper on British Discomycetes [cf. *R.A.M.*, 30, p. 1]. Eight of the subfamilies are dealt with, the ninth, the Trichoscyphelloideae, having been revised previously [loc. cit.]. Full descriptions and keys are provided for 30 genera and 173 species, including two new ones; there are two new names and 22 new combinations. In one appendix a further 11 species are described, of which the systematic position requires further clarification, and in a second notes are given on 28 species referred by Karsten to *Helotium* but excluded by the author. There are indexes to substrata, and to generic and specific names.

Iizuka (H.). **The electron microscopic investigation on classification of conidia of the genus Aspergilli.**—*J. gen. appl. Microbiol., Tokyo*, 1, 1, pp. 10–17, 40 figs., 1955.

The author briefly describes the methods used at the Institute of Applied Microbiology, University of Tokyo, to classify species of *Aspergillus* [see next abstract] by the characters of the conidial walls as shown by the electron microscope [*R.A.M.*, 34, p. 261].

Sakaguchi (K.), Suzuki (I.), & Iizuka (H.). **Studies on the induced mutation of Aspergilli by ultraviolet irradiation.**—*J. gen. appl. Microbiol., Tokyo*, 1, 2, pp. 164–171, 1955.

In ultra-violet irradiation studies [cf. *R.A.M.*, 26, p. 310] at the Institute of Applied Microbiology, University of Tokyo, *Aspergillus usamii* was exposed for one to three minutes, *A. giganteus* for 20 seconds, *A. candidus*, *A. usamii* mut. *shirousamii*, *A. fumigatus*, *A. ochraceus* and *A. nidulans* for 30 seconds, and *A. terreus*, *A. oryzae*, *A. tamarii*, and *A. wentii* for 30 seconds to one minute to give an average survival rate of 3 per cent.

A. candidus produced no coloured mutants and no black mutants were produced by green or bluish species or *vice versa*. Mutations in general tended towards accumulation of pigments and production of sterile colonies, dwarfed conidial heads, and yeast-like colonies with deformed mycelia.

Mutants producing sclerotia were frequently obtained from *A. tamarii* and *A. ochraceus*. Conidial heads changed colour in only 1·1 per cent. of the colonies, indicating the stability of this feature. All the naturally occurring colour mutants were obtained.

Yamamoto (W.). **On the so-called host range of sooty mould fungi.**—*Ann. phytopath. Soc. Japan*, 19, 3–4, pp. 97–103, 1955. [Japanese, with English summary.]

A study of the host range of parasitic and saprophytic sooty mould fungi from Formosa [*R.A.M.*, 35, p. 127] showed that while the parasitic species of Meliola-

ceae and Microthyriaceae are limited to several species in the same genus or the same family, the host range of the saprophytic Capnodiaceae is very varied, as these may occur on any plants on which honeydew is secreted and to which they may have been carried by insects [34, p. 821].

YAMAMOTO (W.). **Spore types in the imperfect stage of some genera of the Capnodiaceae.**—*Ann. phytopath. Soc. Japan*, 20, 2–3, pp. 83–88, 1955. [Japanese, with English summary. Received 1956.]

Single-spore cultures of a number of genera of the Capnodiaceae [cf. *R.A.M.*, 35, p. 723] showed that the imperfect spore types of the genera *Capnodium*, *Neocapnodium*, *Aithaloderma*, and *Triposporiopsis* belong to *Stylospora*, *Spermatium*, *Chaetasbolisia*, and *Triposporium* [31, p. 147], respectively. Neither pycnidiospores nor conidia occurred in the genera *Hypocapnodium*, *Chaetothyrium*, and *Phaeosaccardinula*, while *Antennularia*-type spores were occasionally found in *Limacinia*.

WATERHOUSE (GRACE M.). **The genus Phytophthora. Diagnoses (or descriptions) and figures from the original papers.**—*Misc. Publ. Commonw. Mycol. Inst.* 12, 120 pp., 66 pl., 10 figs., 1956. [Lithoprinted.]

In this compilation are given the original diagnoses (except those in Japanese), or selected descriptions in the absence of a diagnosis, together with reproductions of the relevant figures, of all the species that have ever been put in *Phytophthora* and of the eight genera which have been placed in synonymy with it. Translations of the diagnoses in foreign languages are provided.

DRECHSLER (C.). **Production of zoospores from germinating oospores of Pythium butleri.**—*Sydowia*, 9, 1–6, pp. 451–463, 8 pl., 1955.

An expanded description of the process of zoospore production from germinating oospores of *Pythium butleri* [*R.A.M.*, 13, p. 399; 26, p. 559] is preceded by a taxonomic discussion based on a critical revision of important contributions to the literature and protracted studies on the species in Maryland and elsewhere. The author is not convinced by the arguments of Middleton [22, p. 373] and other workers that *P. butleri* and *P. aphanidermatum* are identical and prefers to retain the former name for the more robust isolates, characterized by profuse aerial mycelium, extensive development of swollen and lobulated parts, and large, much branched sporangia, from various hosts [31, p. 366 *et passim*], including pea, crookneck squash, tomato, tobacco, eggplant, sweet potato, and *Poa pratensis*, *Pythium aphanidermatum* [34, p. 120] being restricted to those of less luxuriant growth.

KARLING (J. S.). **Resting spore germination in Synchytrium.**—*Sydowia*, 9, 1–6, pp. 292–295, 5 figs., 1955.

At Purdue University, Indiana, the mode of resting spore germination was studied in relation to their classification [*R.A.M.*, 35, p. 399] of five species of *Synchytrium* collected from March to June, 1954, in Louisiana and Texas. Host material was stored in envelopes at room temperatures until the following 5th February, when pieces were crumbled and sprinkled on a plain agar plate [loc. cit.]. Some of the sporangia produced from the resting spores remained viable for at least three weeks.

HOPKINS (J. C. F.). **Tobacco diseases.**—xvi+178 pp., 52 pl. (5 col.), 6 figs., Kew, Commonwealth Mycological Institute, 1956. 35*s*.

This volume is based on the author's 'Diseases of Tobacco in Southern Rhodesia' [*R.A.M.*, 11, p. 206], which has been greatly expanded and revised to include all tobacco diseases and disorders occurring in Africa. Reference is also made to

diseases found in the United States and elsewhere when these are common to both areas, and their etiology and control are discussed in relation to the African environment. The book is divided into sections dealing with the nature of plant diseases (pp. 3–9), care of seed-beds and plant hygiene (pp. 10–54), diseases in seed-beds (pp. 55–61), parasitic diseases in the field (pp. 62–141), miscellaneous diseases and disorders (pp. 142–156), and diseases of curing (pp. 157–162). There are a large number of excellent illustrations, mostly black and white photographs, and an extensive bibliography of some 200 titles.

Zech (H.) & Vogt-Köhne (Lore). **Untersuchungen zur Reproduktion des Tabakmosaikvirus. I. Elektronenmikroskopische Beobachtungen.** [Studies on the reproduction of Tobacco mosaic virus. I. Electron-microscope observations.] —*Exp. Cell Res.*, 10, 2, pp. 458–475, 10 figs., 1956. [English summary.]

At the Medical Nobel Institute, Stockholm, individual hair cells and unicellular layers from leaves of White Burley tobacco and *Nicotiana glutinosa* were grouped according to their stage of infection by tobacco mosaic virus and separate extracts of virus material were prepared by differential centrifugation. Analyses were performed by electron microscopy, microspectography, and chemical methods.

The results demonstrated that the total mass of extracted virus substance remained constant from the earliest appearance of the virus particles until a late stage of infection, when the extractable mass in each cell decreased slowly. Hence it was concluded that the whole virus progeny in each cell was synthesized in a short time at an early phase of infection. Extracts contained a progressively increasing number of virus particles of reduced length due to fragmentation, and there was a simultaneous rise in their absorption at 2650 Å, ribonucleic acid content, and infectivity. Fragmentation and loss of ribonucleic acid also occurred *in vitro* when a crude leaf cell extract was mixed with a solution of mainly intact virus particles.

Virus crystals examined *in situ* at an advanced stage of infection had a lower absorption at 2650 Å than those in cells infected earlier. Macerated preparations from isolated crystals contained particles of predominantly normal dimensions, whether taken from early- or late-infected cells. On dissolution of the crystals, however, most of the component particles were found to be fragmented in those from late-infected cells, the majority from the early infection stages containing unbroken ones. Fragmentation must have occurred after solution of the crystals. However, changes in the fragility of the particles, developing parallel with the stage of infection, probably originated during their contact with cellular substances. Both *in situ* and after isolation a number of particles, increasing progressively with the stage of infection, lose their ribonucleic acid. This change is correlated with the increasing fragility of the extracted particles and the subsequent degradation of their protein shells.

Schuster (H.), Schramm (G.), & Zillig (W.). **Die Struktur der Ribonucleinsäure aus Tabakmosaikvirus.** [The structure of the ribonucleic acid from Tobacco mosaic virus.]—*Z. Naturf.*, 11 b, 6, pp. 339–345, 2 graphs, 1956.

Further experiments in the current series at the Max Planck Institute for Virus Research, Tübingen, Germany [*R.A.M.*, 35, p. 551 and next abstract], resulted in the isolation from tobacco mosaic virus solution, by extraction with phenol, of an acid free from virus protein and having an average molecular weight of 900,000. The acid is unstable, breaking up into subunits with a molecular weight of 60,000, which were shown to be capable of forming parallel and longitudinal aggregates. The fibrillar structure of the ribonucleic acid could also be demonstrated electron-microscopically. The diameter of the fibrils is variable but of the same order of magnitude as in high-molecular desoxyribonucleic acid.

Schramm (G.). **Neuere Untersuchungen über die Struktur des Tabakmosaikvirus und ihre biologische Bedeutung.** [Recent studies on the structure of the Tobacco mosaic virus and its biological importance.]—*Zbl. Bakt.*, Abt. 2, 109, 13–19, pp. 322–324, 2 figs., 1956.

In this paper, presented at the 25th conference of the German Association for Hygiene and Microbiology held at Bad Kissingen from 26th to 30th April, 1955, information on the structure of tobacco mosaic virus particles is summarized from 20 contributions to the literature on the subject (including a number by the author and collaborators) [cf. preceding abstract]. Most of the work has been noticed from time to time in this *Review*.

Newmark (P.) & Fraser (D.). **Composition of an abnormal protein present in Tobacco plants infected with Tobacco mosaic virus.**—*J. Amer. chem. Soc.*, 78, 8, pp. 1588–1590, 1 graph, 1956.

As part of a general study at the Virus Laboratory, University of California, Berkeley, on the relationship of the abnormal protein free from nucleic acid in mosaic-infected tobacco plants [*R.A.M.*, 35, pp. 127, 724] to the virus itself it was found that the same 14 amino acids were present in both, in approximately the same quantities.

Pollard (E.) & Dimond (A. E.). **The inactivation of Tobacco mosaic virus by ionizing radiation.**—*Phytopathology*, 46, 4, pp. 214–218, 5 graphs, 1956.

It is reported in this joint contribution from Yale University and the Connecticut Agricultural Experiment Station that the bombardment of dry, purified tobacco mosaic virus by deuterons and alpha particles [cf. *R.A.M.*, 19, p. 370; 22, pp. 103, 218] results in a maximum inactivation cross section of $3{\cdot}5 \times 10^{-11}$ sq. cm., which varies with ion density for very fast deuterons in a manner necessitating three simultaneous ionizations to produce inactivation. Partial inactivation of the virus by sonic vibrations [cf. 30, p. 633] reduced its sensitivity to alpha particles but not to deuterons. Densely ionizing alpha particles, therefore, may cause the transfer of radiation energy over 300 Å from one infectious unit of aggregated rods to another.

Low-voltage (55 Kv) X-rays proved to be more effective in virus inactivation [35, p. 724] than an equivalent amount of energy in the form of 2 Mev (fast) electrons, a fact probably related to the three-ionization requirement.

An analysis of the radiation data yields two estimates of virus dimensions by independent methods [35, p. 725]: an effective thickness of 100 Å from inactivations by deuterons and alpha particles, and a radius of 57 Å and length of 3,070 Å from 2 Mev electrons. Comparing these with the 87 (hexagon side) by 3,000 Å seen by the electron microscope (*Biochim. biophys. Acta*, 8, pp. 227–244, 1951), the authors tentatively explain the discrepancy by suggesting the existence in the virus of a central radiation-sensitive nucleoprotein core with a radius about two-thirds that of the whole virus, which is surrounded by a protein capsule much less sensitive to radiation.

Porter (C. A.). **Evaluation of a fluorocarbon technique for the isolation of plant viruses.**—*Trans. N.Y. Acad. Sci.*, Ser. II, 18, 8, pp. 704–706, 1956.

The applicability of two fluorocarbon compounds for the purification of tobacco mosaic virus has been investigated at the Boyce Thompson Institute for Plant Research, Yonkers, New York. The initial experiments were performed with a 3:1 mixture of freon 112 and *n*-heptane, but genetron 226 was used in most of the later trials. Infected tobacco tissue was homogenized directly in a system containing the fluorocarbon and 0·01 M phosphate buffer at pH 7, generally in the proportions

of 10 gm. tissue, 4 ml. buffer, and 10 ml. fluorocarbon. A Vir Tis 45 homogenizer operating at top speed for one to five minutes produced an emulsion which separated into three layers when centrifuged for five to ten minutes at about 1,000 g. The upper aqueous layer contained the virus, which was further purified by ultracentrifugation and assayed by a spectrophotometric method.

Compared with the chloroform emulsification [*R.A.M.*, 32, p. 345], heat-ultra [32, p. 699], and trypsin digestion [31, p. 149] methods, the fluorocarbon procedure yielded more virus protein, while infectivity, expressed on a tissue-concentration basis and assayed by local-lesion development on Pinto beans [*Phaseolus vulgaris*], was higher following fluorocarbon emulsification than when homogenized in buffer only. The optimum period of homogenization for infected tobacco tissue was four to five minutes at top speed.

When infected tissue was subjected to two fluorocarbon treatments about 25 per cent. of the virus was lost in the second emulsification. At the same time a further purification was effected by the removal of extraneous protein.

Fluorocarbon preparations of tobacco ring spot virus, compared with buffer homogenates, produced more local lesions on black cowpeas and higher absorption at 260 mμ, but with cucumber mosaic virus the position was reversed and further trials are in progress to investigate these results.

Yoshii (H.), Tokushige (Y.), & Nonaka (F.). **Accumulation of radioactive phosphorus-32 or sulphur-35 in the lesions produced by various treatments on the leaves of some Nicotiana plants.**—*Ann. phytopath. Soc. Japan*, 20, 1, pp. 16–20, 9 figs., 1955. [Japanese, with English summary. Received 1956.]

Accumulation of radioactive phosphorus (P^{32}) or sulphur (S^{35}) round the lesions produced on *Nicotiana* plants by various treatments was tested at the Laboratory of Plant Pathology, Kyushu University, Japan, using water cultures containing these isotopes [*R.A.M.*, 34, p. 473]. Zonate accumulation of P^{32} was observed in the spots produced on tobacco leaves by 2 per cent. copper sulphate and, more especially, by a saturated solution of potassium chlorate. Both isotopes accumulated at necrotic spots on *Nicotiana glutinosa* 48 hours after inoculation with tobacco mosaic virus but not around holes made by a cork-borer.

Guillemenet (R.) & Tave (J.). **Essai comparatif de divers fongicides minéraux et organiques dans la lutte contre l'alternariose (Alternaria dauci (Kühn) Groves et Skolko-forme Solani (Ell. & Mart.) Neerg. Adelomycètes, Dematiaceae) sur Tomate pendant la campagne 1953–1954.** [Comparative trial of various mineral and organic fungicides for the control of alternariosis (*Alternaria dauci* (Kühn) Groves and Skolko *f. solani* (Ell. & Mart.) Neerg. Adelomycetes, Dematiaceae) on Tomato in the campaign of 1953–1954.]—*Fruits Prim. Afr. N.*, 24, 262, pp. 504–517, 2 graphs, 1954. [Received 1955.]

A controlled field experiment was carried out at Carrières ben Amid, near Casablanca, Morocco, on the control of early blight (*Alternaria dauci* f. sp. *solani*) [*A. solani*] on the tomato variety Marmande. The seeds were sown on 6th October, 1953, and 20 treatments were given starting on 27th October and finishing on 12th May, 1954.

The five fungicides tested produced little effect on the collar rot phase in young plants. All, however, gave good protection to the foliage, particularly zineb [*R.A.M.*, 35, p. 244], captan, and manzate. On 4th March the percentages of affected fruits on plants treated with these three fungicides were 4·8, 4·94, and 6·27, compared with 16·93 for Bordeaux mixture, 32·32 for copper oxychloride, and 45·76 for the untreated. The corresponding yields (in tons per ha.) were 49·7, 41·9, 47·7, 34·5, 33·3, and 29·8.

Murray (J. S.). **Rusts of British forest trees.**—*Bookl. For. Comm.* 4, 15 pp., 8 pl. (4 col.), 1955.

Notes are given on the occurrence, hosts, symptoms, and control where possible of most of the Uredinales attacking forest trees in Great Britain. The information is also summarized in a useful table giving the host, parts affected, symptoms, and pathogen.

Nienstaedt (H.) & Graves (A. H.). **Blight resistant Chestnuts.**—*Circ. Conn. agric. Exp. Sta.* 192, 18 pp., 10 figs., 1955.

Information is given on the culture and care of chestnut trees resistant to blight (*Endothia parasitica*) [*R.A.M.*, 35, p. 558], of which the Chinese chestnut (*Castanea mollissima*) is the most promising in the United States, the varieties Abundance, Kuling, Meiling, and Nanking being noteworthy for orchard cultivation.

Griswold (C. L.). **Interval between Oak wilt fungus inoculation by Drosophila melanogaster and appearance of foliar symptoms.**—*J. econ. Ent.*, 49, 3, p. 429, 1956.

Transmission of the oak wilt fungus *Endoconidiophora fagacearum* [*Chalara quercina*] by *Drosophila melanogaster* was effected in 17 tests performed during 1953–4 at the Ohio Agricultural Experiment Station [*R.A.M.*, 35, pp. 248, 729]. All the plants were two- to four-year-old seedlings except one, which was a tree about 40 years old. The presence of the fungus was confirmed by culturing. The interval between inoculation and the appearance of foliar symptoms ranged from 18 to 71 days in the 13 trees contracting the disease during the same year and from 243 to 330 in the four remaining free from external signs of infection until the following season.

Welch (D. S.) & Matthysse (J. G.). **Control of the Dutch Elm disease in New York State.**—*Cornell Ext. Bull.* 932, 14 pp., 7 figs., 1955.

This publication describes the cause and spread of Dutch elm disease (*Ceratostomella ulmi*) [*R.A.M.*, 35, p. 55] and suggests communal methods of control applicable in New York State. These are essentially based on control of the vector bark beetles (*Scolytus multistriatus* and *Hylurgopinus rufipes*) by burning or burying all dead, dying, or weakened elms or parts of elms. Control by spraying such material with DDT should only be used as a last resort, and protective DDT spraying of dormant trees is advised only in special circumstances. Notes are given on the general care of elms.

Horner (Ruth M.). **A Diaporthe canker of Betula lutea.**—Abs. in *Proc. Canad. phytopath. Soc.*, 23, pp. 16–17, 1955.

In the course of mycological investigations on yellow birch (*Betula lutea*) in Ontario, cankers and diseased foliage constantly yielded isolates of a *Phomopsis* [*R.A.M.*, 34, p. 409] the perfect state of which has been found to be morphologically similar to *Diaporthe eres* and is here designated *D. e.* f. sp. *betulae*. Artificial inoculation with the fungus consistently reproduced the type of lesion from which it was isolated. *D. e.* f. sp. *betulae* is a facultative parasite causing superficial bark cankers on young branches and capable of killing foliage and young shoots, though young birch trees growing in a favourable environment recovered from infection if no secondary organisms became established, the cankers healing over in two or three years. The parasite is important in the field as causing older trees to become susceptible to infection by secondary pathogens such as *Fomes fomentarius* [35, p. 130] and also seriously affecting young seedlings growing in their natural environment of low light intensity and high humidity.

Wallis (G. W.) & Buckland (D. C.). **The effect of trenching on the spread of yellow laminated root rot of Douglas Fir.**—*For. Chron.*, 31, 1, pp. 356–359, 4 figs., 1956.

At the Cowichan Lake Forest Experiment Station, Vancouver Island, a small patch (about 0·1 acre) of 15- to 20-year-old Douglas firs [*Pseudotsuga taxifolia*], observed in 1931 to be dying from root rot (*Poria weirii*) [*R.A.M.*, 33, p. 693], were isolated by a trench 1 ft. wide, dug down to hardpan level. A second similar trench surrounding the first formed an isolation zone of 0·3 acre in which root rot was not observed at the outset of the experiment.

The disease spread in the inner plot, killing 49 of the original 99 dominant or co-dominant trees, and 23 of the 75 intermediate or suppressed ones. In the isolation zone the infections which occurred were separated from the trench by healthy trees, making it clear that the trench had confined the disease. The present study confirms that the fungus does not spread through the soil [loc. cit.] as there was sufficient litter and soil in the trench in the last decade to allow the fungus to pass had it been capable of doing so.

The influence of certain silvicultural practices on the disease is currently under study at the Division of Forest Disease Research, United States Forest Service, Portland, Oregon, and at the Forest Biology Laboratory, Victoria, British Columbia, but so far no economically sound method of control has emerged.

Salisbury (P. J.) & Long (J. R.). **A new needle blight of Douglas Fir seedlings caused by Rosellinia herpotrichioides Hepting and Davidson.**—Abs. in *Proc. Canad. phytopath. Soc.*, 23, p. 19, 1955.

During the autumn and winter of 1954–5 20 Douglas fir [*Pseudotsuga taxifolia*] seedlings in the Forest Service Nursery, Duncan, British Columbia, were attacked by *Rosellinia herpotrichioides*, [*R.A.M.*, 16, p. 574], constituting new host and province records. All needles within a layer of high humidity were killed, those seedlings in beds with a high water table being particularly affected. The total cull from all the beds averaged 3 per cent. from this needle blight, and less than 10 per cent. from other defects. The optimum growth *in vitro* for *R. herpotrichioides* was between 20° and 25° C., and was nil at 0°.

Vaartaja (O.) & Whitney (R. D.). **Spread of 'red patch' disease.**—*Bi-m. Progr. Rep. Div. For. Biol., Dep. Agric. Can.*, 12, 3, p. 3, 1956.

The causal organism of red patch disease of seedling white spruce (*Picea glauca*), an unidentified snow mould [*R.A.M.*, 34, p. 413], was not detected in soil below the patches. The disease spread more rapidly from living seedlings than those already killed, and was fatal only to slow-growing seedlings. The pathogen was able to traverse a distance of 12 in. from the inoculum to a healthy seedling in a nursery experiment, but did not spread in a field experiment with distances of 4 to 6 ft. between healthy and diseased seedlings. The disease is thus primarily of importance in seed-beds and infected seedlings are not likely to cause losses in plantations.

Nordin (V. J.). **Red stain in Lodgepole Pine.**—Abs. in *Proc. Canad. phytopath. Soc.*, 23, p. 18, 1955.

In further studies on 133 living trees of lodgepole pine [*Pinus contorta* var. *latifolia*] in Alberta [cf. *R.A.M.*, 34, p. 419] 90 per cent. of all infections were firm red stains, mainly associated with *Stereum pini* (86 per cent.), *Fomes pini* (7), *S. sanguinolentum* (3), and *Polyporus anceps* (4). *S. pini* and *F. pini* usually enter through branch stubs, but also by fire scars, falling tree scars, and roots.

Dominik (T.) & Pachlewski (R.). **Badanie mykotrofizmu zespołów Sosnowych w Łebie nad Bałtykiem.** [Studies on mycotrophy in Scots Pine stands at Leba on the Baltic.]—*Roczn. dendrol. polsk. Tow. bot., Warsz.*, 10, pp. 53–96, 1955. [Russian and German summaries. Abs. in *For. Abstr.*, 17, 3, p. 349, 1956.]

A study of the plants in a number of pine stands near the Leba estuary, Poland, showed that there were more than twice as many mycotrophic species in stable than in partly shifting dunes. Plants autotrophic in sparse communities in the latter were mycotrophic in the dense, older colonies of the former. The mycorrhiza on Scots pine were different in the different communities. Optimum development was between the scales of the old bark of the root collar. Pine formed few mycorrhiza in litter and still less in mineral soil. Oak [*R.A.M.*, 35, p. 315] and birch formed, in addition to typical ectotrophic mycorrhiza, small amounts of the endotrophic tolypophagous type.

Petrak (F.). **Über Phacidium infestans Karst., einen gefährlichen Parasiten der Zirbelkiefer und einige andere in seiner Gesellschaft wachsende Pilze.** [On *Phacidium infestans* Karst., a dangerous parasite of Stone Pine, and some other fungi growing in association with it.]—*Sydowia*, 9, 1–6, pp. 518–526, 1 fig., 1955.

In the middle of August, 1955, the author received from slopes of the Tyrolean Alps, Austria, at an altitude between 1,900 and 2,200 m., numerous branches of stone pine (*Pinus cembra*) heavily infected by *Phacidium infestans* [cf. *R.A.M.*, 30, p. 202]. It was stated in the accompanying report that needles killed by the pathogen (which is restricted to snow-covered branches) in the spring of 1954 were whitish-grey and more or less densely coated with apothecia, but those in the material investigated merely showed a yellow or red-brown discoloration with no trace of the fungus.

Associated with *P. infestans* on some of the diseased branches were *Dasyscypha flavovirens*, *Pleurodiscus wettsteinii* n. sp., and *Lophodermium pinicolum* Tehon [15, p. 54], which is regarded as the correct name for the *Lophodermium* on pine; *L. pinastri* should be reserved for the fungus on *Abies* and *Picea* as the type host has been identified as *A. pectinata*. *Dothichiza pityophila* [32, p. 598] and *Cytospora pinastri* occurred independently of *Phacidium infestans* on some of the old or overmature needles.

Grimal (R.). **Les dangers de maladies et d'invasions d'insectes par l'introduction d'arbres exotiques.** [The dangers of diseases and insect invasions caused by the introduction of exotic trees.]—*Chêne-liège*, 62, 1525, pp. 25, 27, 29; 1526, pp. 31, 33, 35; 1527, pp. 17, 19, 1956.

The author gives brief notes in popular terms on some of the principal diseases that have affected exotic trees [cf. *R.A.M.*, 35, p. 53] in various countries recently, including *Valsa superficialis* on *Pinus excelsa*, *Cenangium abietis* [cf. 26, p. 366] on *P. densiflora*, and *Cronartium comptoniae* [30, p. 351] on Austrian pine [*P. nigra*] in the United States. The means by which plant pathogens may be spread are indicated. The final section deals succinctly with diseases of poplars [34, p. 495] and other trees. It is concluded that before a newly introduced species is planted care should be taken to ascertain that it possesses some particular advantage over the native species and is likely to grow well in its new surroundings. A long-term experimental planting scheme should be carried out whenever possible. In general, the planting of exotic trees is unlikely to prove successful.

Murray (J. S.). **Lime-induced chlorosis of Corsican Pine at Friston Forest, Sussex.** —*J. For. Comm*, 24, pp. 78–82, 1955.

During April, 1955, preliminary investigation was made into the dying of Corsican pine [*Pinus nigra* var. *calabrica*] growing on chalk in Friston Forest, Sussex.

The trees exhibited typical chlorosis, which was also noticed on other plants in the vicinity. The top soil was sparsely rooted; below this, the roots extended in the fractured chalk to a depth of over three feet. Austrian pine [*P. n.* var. *austriaca*] was less susceptible to the chlorosis, the exact cause of which remains to be elucidated.

ZIEGER (E.). **Die heutige Bedeutung der Industrie-Rauchschäden für den Wald.** [The present importance of damage from industrial fumes in the forest.]—*Arch. Forstw.*, 4, 1, pp. 66–79, 1955. [Abs. in *For. Abstr.*, 17, 3, p. 397, 1956.]

This survey includes a historical review of damage to trees by industrial fumes [*R.A.M.*, 34, p. 7], notes on damage to trees and soil, diagnosis by analyses, biological tests, valuation of damage, and protective measures. Inconclusive tests on resistant spruce in damaged stands seem to indicate that Härtel's cloudiness test for wax secretion may be of decisive importance for indicating both damage and resistance. The author proposes in detail the setting-up of an industrial fume damage commission for Germany.

CRAM (W. H.) & VAARTAJA (O.). **Toxicity of eight pesticides to Spruce and Caragana seed.**—*For. Chron.*, 31, 1, pp. 247–249, 1956.

In work at the Forestry Biology and Horticulture Divisions, Experimental Farms Service, Department of Agriculture, Ottawa, seeds of Colorado spruce (*Picea pungens*) and the Siberian pea tree (*Caragana arborescens*) were treated (at the maximum adherent dosage) before or after stratification (41° F. for 15 days in moist sand before sowing) with 0·5 per cent. mercuric chloride (the seeds being rinsed with water after dipping), tersan (75 per cent. thiram), arasan (50 per cent. thiram), orthocide (75 per cent. captan), manzate (maneb), or ceresan M. *P. pungens* seeds were tested also with Stauffer N 244 (3-*p*-chlorophenol-5-methyl rhodanine) and chinosol, and *C. arborescens* with spergon SL (chloranil). Toxicity was evaluated in terms of the capacity and speed of germination, the latter being calculated in terms of the index rate of germination.

Applied before stratification they had little or no influence on either species, except that ceresan M reduced the capacity and speed of germination in *Caragana*, and the speed in *Picea*. Applied after stratification ceresan M killed all seeds and chinosol all *P. pungens*; manzate killed all *Caragana* and over half of the *Picea* seeds; Stauffer N 244, thiram preparations, spergon SL, and orthocide 75 were mildly toxic. Mercuric chloride was harmless [cf. *R.A.M.*, 30, p. 638].

HENDERSON (F. Y.). **Report of the Director of Forest Products Research for the year 1955.**—*Rep. For. Prod. Res. Bd, Lond., 1955*, pp. 6–57, 8 pl., 2 graphs, 1956.

In the section of this report [cf. *R.A.M.*, 35, p. 565] dealing with mycology (pp. 31–35) further investigations on timber soft rot, with particular reference to its occurrence in cooling towers [loc. cit.] are noted and it is suggested that under tropical and subtropical conditions high temperatures may favour attack by bacteria rather than by fungi. Tests of some 20 species of timber against *Chaetomium globosum* showed that, in general, resistance of hardwoods to this fungus is proportional to their resistance to attack by basidiomycetes, in contrast to coniferous woods, those of low durability being highly resistant to *C. globosum*. The absorption of about 0·6 lb. pentachlorophenol per cu. ft. was necessary to prevent attack of beech veneers by *C. globosum* in tests by Abrams's mycelial mat method [29, p. 473].

The outer heartwood of African mahogany (*Khaya* spp.) was much more resistant than the innermost to attack by *Coniophora cerebella* [*C. puteana*], *Polystictus versicolor*, and *P. sanguineus*.

Further experiments on the control of *Merulius lacrymans* [35, p. 566] showed

that the efficacy of 1 per cent. sodium pentachlorophenate applied to cement-lime mortar lasted for three months, but was much reduced by leaching with water. Sodium *o*-phenyl phenolate was equally effective.

Untreated beech logs left on the ground [loc. cit.] were extensively decayed by such fungi as *Stereum purpureum* and *Hypoxylon coccineum* even after eight months, whereas spraying with creosote or 5 per cent. sodium pentachlorophenate and applying a bituminous coating to exposed ends practically eliminated decay during the year's trial [cf. next abstract].

Shinjyo (M.) & Kawasaki (T.). **Studies on the preliminary preservation of Beech lumber for pulp making.**—*Wood Industr. Tokyo*, 11, 3, pp. 138–142, 1956. [Japanese, with English summary. Abs. in *For. Abstr.*, 17, 3, p. 451, 1956.]

The spraying of the cut ends of beech logs [cf. preceding abstract] with 5 per cent. aqueous sodium pentachlorophenol, with or without subsequent treatment with 1 per cent. zinc sulphate to fix the protectant in the form of the less soluble zinc salt, gave good protection to the ends and some interior effect, the zinc treatment being superior.

Lohwag (K.). **Zur Abbauintensität holzzerstörender Pilze.** [On the intensity of decomposition by wood-destroying fungi.]—*Sydowia*, 9, 1–6, pp. 359–366, 1955. [English summary.]

At the Institute for Soil Culture, Vienna, the standard German method DIN 52176 [cf. *R.A.M.*, 21, p. 277] and Leutritz's procedure [25, p. 588 *et passim*] were used to gauge the intensity of wood decomposition by four wood-inhabiting fungi on specimens of *Abies alba*, *Acer platanoides*, alder, ash, beech, larch, spruce, pine (*Pinus nigra* and *P. sylvestris*) and oak (*Quercus sessiliflora*). Results showed that variations arise from the relative suitability of different nutrient media and methods of assay. Of these and 27 other species, *Coniophora cerebella* [*C. puteana*], *Fomes pinicola*, *Merulius lacrymans*, *Polyporus betulinus*, and *Polystictus versicolor* may be ranked as agents of rapid and intensive decomposition, while *Fomes annosus* and *Trametes* [*F.*] *pini* are slower and milder, as determined from a study of the literature.

Blew (J. O.). **Study of the preservative treatment of lumber.**—*Rep. For. Prod. Lab., Madison*, 2043, 16+23 [unnumbered] pp., 13 figs., 7 graphs, 1955.

In comparative studies at the Forest Products Laboratory, Madison, Wisconsin, end-matched Douglas fir [*Pseudotsuga taxifolia*] and shortleaf pine [*Pinus echinata*] timber, in 4 ft. lengths 2 and 4 in. thick, were treated with pressure and non-pressure preservative processes, using the three standard types of preservative, creosote, oil-soluble (pentachlorophenol solution), and water-soluble (chromated zinc chloride). The results are tabulated and illustrated. Among the conclusions drawn it is noted that recognized minimum retentions were always achieved with creosote and pentachlorophenol solution applied by pressure impregnation. The best penetration by the vacuum process was in the sapwood of seasoned pine. Cold soaking and three-minute dips in oil-soluble preservatives were not effective. In general, sufficient retention of chromated zinc chloride was obtained only by pressure impregnation. Incising the Douglas fir samples improved the penetration of chromated zinc chloride applied by steaming and vacuum and of oil-soluble preservatives applied by pressure impregnation.

Lindgren (R. M.). **Color test for early storage decay in Southern Pine.**—*Rep. For. Prod. Lab., Madison*, 2037, 5 pp., 1 fig., 1955. [Mimeographed.]

At the Forest Products Laboratory, Madison, Wisconsin, early infection of the sapwood of southern pine [*Pinus* spp.] in storage by the common decay fungus

Peniophora gigantea [*R.A.M.*, 32, p. 53] was detected qualitatively by spraying freshly exposed end-grain surfaces with an aqueous solution of alizarin red S. Infected sapwood was stained yellow while uninfected turned pink. The presence of staining or moulding organisms did not affect the test.

Findlay (W. P. K.). **Timber decay—a survey of recent work.**—*For. Abstr.*, 17, 3, pp. 317–327, 1956.

This is a brief survey of the more important results of research on timber decay from the literature available since 1942 [cf. *R.A.M.*, 23, p. 84] under the headings 'Description of tree and timber fungi', 'Heart rot in standing trees', 'Physiology of wood-rotting fungi', 'Decay of wood by micro-fungi and bacteria', 'Influence of decay on the physical and chemical properties of wood', 'Natural durability of wood', 'Decay of wood in storage and transport', 'Decay of wood in use', and 'Laboratory testing of wood preservatives'.

Zubieta (G. J.) & Gómez (C. E.). **Estudio comparativo de métodos utilizados en toximetria de preservadores de madera. I. Resistencia natural al decaimiento de Eucalyptus leucoxylon F. v M. comparada con Quebracho colorado.** [Comparative study of methods used in the toximetry of wood preservatives. I. The natural resistance to decay of *Eucalyptus leucoxylon* F. v M., compared with Quebracho.]—*Industr. y Quím.*, 17, 2, pp. 78–82, 104, 4 figs., 1955.

The loss of weight in wood blocks of *Eucalyptus leucoxylon* and *Schinopsis lorentzii* on vigorous malt agar cultures of *Polystictus sanguineus* [*R.A.M.*, 31, p. 514], *Poria* sp., *Coniophora cerebella* [*C. puteana*], and an unnamed member of the Polyporaceae (L.C.F. 1213) in three months at 26° to 28° C. was used as a measure of decay at the laboratory of Railways and Telecommunications [Buenos Aires, Argentina]. The two last-named fungi were the most active on *S. lorentzii*, which was rated as 'resistant' according to Findlay's classification [18, p. 221], *E. leucoxylon* being very resistant. A modified Leutritz procedure [see preceding page] and a method using a supplemented sawdust medium as described by Badcock [21, p. 176] gave inconsistent results. It is considered desirable to use as many strains of a fungus as possible in view of the sensitivity of some to substances present in the wood.

Yukawa (Y.). **Histo-chemical studies on plant gall tissues IV. Pathological observation on club-root tissue of Chinese Cabbage.**—*Bull. Fac. Agric. Yamaguti Univ.* 6, pp. 69–74, 2 pl., 1955. [Received 1956.]

At the Laboratory of Plant Pathology, Yamaguti University, Japan [cf. *R.A.M.*, 35, p. 736], studies on Chinese cabbage plants of the variety Nozaki Nigo, naturally infected by *Plasmodiophora brassicae*, confirmed the observations of previous workers [14, p. 206 *et passim*]. In the root small, thin-walled cells invaded by the plasmodia were found between the vessels and appeared to be secondary cambium. The living cells next to the old, dead, invaded tissue sometimes divided several times tangentially.

Smith (J. E.). **Host-parasite physiology in relation to club-root disease of crucifers.**—*Diss. Abstr.*, 16, 3, pp. 440–441, 1956.

In studies at Purdue University the germination of resting spores of *Plasmodiophora brassicae* [cf. *R.A.M.*, 31, p. 170; 35, p. 804] isolated from minced tissue of surface-sterilized galls from wild and cultivated crucifers depended on the age of the tissue, spores from young galls germinating better in non-sterile soil extracts than in sterile media, phosphate buffer, or distilled water. This effect was due to soil micro-organisms and could be duplicated by treating the spores with trypsin,

pepsin, commercial pancreatic extract, or a proteinase preparation from soil bacteria. It was concluded that these enzymes increased germination by digesting a protein matrix on spores in solid gall tissue.

Excised radish roots, which have active apical meristems, when grown in a glucose-nutrient salts medium supplemented with vitamins were stimulated by riboflavin and growth auxins but when infected they did not respond to indole acetic acid, reacted only slightly to indole butyric acid and *p*-chlorophenoxyacetic acid, but strongly to riboflavin, whereas both infected and uninfected cabbage roots, which grow by cell elongation, were stimulated by all. The transport of nitrogen to the tips of infected cabbage roots was increased by indole acetic acid and *p*-chlorophenoxyacetic acid but had little effect on its transport in infected radish roots. It was considered that cessation of growth in actively growing radish root cultures resulted from a supra-optimal concentration of auxin brought about by the pathogen.

Chemical analyses of incipient cabbage hypocotyl tumours made at intervals of 0, two, four, seven, 11, 16, and 22 days after wounding and inoculation showed that nucleic acid, protein nitrogen, and total nitrogen syntheses were similar in *P. brassicae* galls and *Agrobacterium tumefaciens* tumours [cf. 35, p. 736].

Smith (M. A.) & Ramsey (G. B.). **Bacterial zonate spot of Cabbage.**—*Phytopathology*, 46, 4, pp. 210–212, 1 fig., 1956.

A bacterial disease of Florida-grown cabbage first observed on the Chicago market in January, 1953, was characterized by the development on the outer and second head leaves of round to irregular, zonate or target-like, buff to wood-brown lesions, later turning seal-brown and measuring 2 to 10 mm. in diameter. The bacterium isolated from the diseased tissues proved to be pathogenic to a number of other crucifers, cucurbits, beans [*Phaseolus vulgaris*], peas, tomato, [chilli] pepper, beet, onion, lettuce, and witloof chicory.

As the result of comparative studies on the morphological and cultural characters, biochemical reactions, and pathogenicity, the agent of the cabbage leaf spot is identified as *Pseudomonas cichorii*.

Beddall (J. L.) & Quarrell (C. P.). **Whiptail of early Cauliflowers.**—*Agriculture, Lond.*, 63, 3, pp. 114–118, 1956.

Field observations having suggested that whiptail of cauliflowers [*R.A.M.*, 35, p. 804] is often associated with accidental application of excess fertilizer, a trial was set up in 1955 with seedlings of the cauliflower variety Finney 110, raised in pots, half of them receiving sodium molybdate in watering. These were set out in mid-March in a field (pH 6·7) before the addition of farmyard manure and lime, each at 10 cwt. per acre, followed by a 12–12–15 base dressing applied in mid February at the rates of 10, 20, or 30 cwt. per acre, the soil being subsequently cultivated to the depth of 6 in. A top dressing of nitro chalk was applied to each plant at 5 or 10 cwt. per acre ($\frac{3}{4}$ or $1\frac{1}{2}$ oz. per plant) three weeks after planting, or 15 cwt. after six weeks.

Whiptail symptoms appeared a few weeks after the first top dressings in the plots which had received the heavier base and top dressings and no molybdenum, and by mid June affected from two to 38 per cent. of the plants in different plots. Plants which had received molybdenum grew normally.

To prevent whiptail, checks to seedling growth must be avoided, and also heavy nitrogen dressings on them; the pH of the field should not be below 6·5; and base fertilizers must be applied evenly. If whiptail is expected and molybdenum applied, 1 oz. sodium molybdate in 4 gals. water to 1,500 plants in 3-inch pots is the maximum dose.

Cosentino (V.). **Ricerche sulle proteini normali e anormali delle piante. I. Isolamento da piante sane di Brassica chinensis di particelli submicroscopiche somiglianti al virus del TYM (Turnip yellow mosaic).** [Studies on normal and abnormal plant proteins. I. Isolation from healthy *Brassica chinensis* plants of submicroscopic particles resembling the virus of TYM (Turnip yellow mosaic).]—*Ric. sci.*, 26, 2, pp. 462–469, 7 figs., 1956. [French, English, and German summaries.]

At the Virus Laboratory, University of Berkeley, California, the author detected in healthy Chinese cabbage plants of local origin spherical particles which under the electron microscope were scarcely distinguishable from those of turnip yellow mosaic virus [*R.A.M.*, 33, p. 583]. Material of the latter (which is described as 'practically unknown' in the United States) was furnished by European workers. The particles occurring in Chinese cabbage, however, are non-infectious and further differ from those of turnip yellow mosaic in other properties. The application of the analytical ultracentrifuge to material extracted from the healthy plants resulted in the differentiation of two main components, with sedimentation constants of 77 and 18 S, respectively, with a small percentage of a third constituent (50 S).

Lassack (H.). **Verhaltensbiologische Untersuchungen an der Rübenblattwanze Piesma quadrata Fieb.** [Studies on biological factors in relation to the Beet leaf bug *Piesma quadrata* Fieb.]—*Z. angew. Ent.*, 38, 4, pp. 449–467, 1 graph, 1956.

This is a comprehensive report on field observations and laboratory studies on the relation of temperature, light, and wind to the distribution of *Piesma quadrata* [*Zosmenus quadratus*], the vector of beet leaf crinkle virus, in Lower Saxony, Germany [*R.A.M.*, 35, p. 741].

Deems (R. E.) & Young (H. C.). **Black root of Sugar Beets as influenced by various cropping sequences and their associated mycofloras.**—*J. Amer. Soc. Sug. Beet Tech.*, 9, 1, pp. 32–43, 5 graphs, 1956.

The authors cropped an experimental plot at Hoytville, Ohio, with beet for two seasons, raising the incidence of black root (*Aphanomyces cochlioides*) [*R.A.M.*, 35, p. 260] to approximately 100 per cent. The plot was then divided into subplots sown in early May with lucerne, maize, oats, or sugar beet. Subsequently the fungus flora was assessed monthly on a suitable medium and the amount of black root present checked by the infection of beet seedlings grown on samples of the soils.

In the maize plots there was a rapid decrease in the incidence of black root, such that the August and subsequent samples produced only about 10 per cent. infection in test seedlings, as against 100 per cent. in the sugar beet plots. With oats there was also a rapid decrease until the crop was ploughed in at the beginning of September, when there was a rapid increase to approximately the original level by November. With lucerne there was a slight, insignificant decrease.

In the maize plots *Trichoderma viride*, *Absidia butleri*, and three species of *Penicillium* were more common and several other fungi less so than with lucerne or sugar beet. With oats *T. viride* and *Aspergillus fumigatus* were predominant; ploughing in produced a sharp rise in the total number of fungi, attributable entirely to an epidemic of two *Fusarium* species. Lucerne soils differed from all others in containing higher numbers of *Myrothecium verrucaria*, *Ascochyta* sp., and *F. merismoides*, and fewer *A. fumigatus*, *Cephalosporium acremonium*, *P. oxalicum*, and *F. oxysporum*. Sugar beet soils differed primarily in their higher numbers of *Acrostalagmus* spp. and *F. roseum*. The authors consider that these changes in the saprophytic flora, characteristic for each crop, are related to the changes in incidence of the black root organism, and they list the antibiotics obtainable from certain of the fungi concerned, that may play a part in deciding which constituents of the microflora prevail.

Sylvester (E. S.). **Beet mosaic and Beet yellows virus transmission by the green peach aphid.**—*J. Amer. Soc. Sug. Beet Tech.*, 9, 1, pp. 56–61, 6 graphs, 1956.

Using data from the literature the author has plotted curves (time of feeding against percentage transmission) showing the acquisition threshold and the duration of feeding for maximum transmission of beet mosaic and beet yellows viruses [*R.A.M.*, 32, p. 56; 34, p. 208] by the peach aphid (*Myzus persicae*). The curves are essentially similar except for the time scale. For transmission of mosaic the optimum feeding time is 25 seconds, whereas for yellows it is approximately 17 hours. It should be easier to prevent the acquisition of yellows in the field than of mosaic virus.

For beet mosaic, maximum inoculation is effected by a feed lasting 12 seconds or more, while with yellows the inoculation threshold is only reached in a matter of minutes, maximum inoculation resulting from feeds of three hours or longer. Under most conditions mosaic virus is not retained at infective concentrations for more than half an hour, the half life of the virus in a feeding aphid being approximately five minutes. For yellows virus the half life is about eight hours.

Boasso (Celia). **Curly top o encrespamiento de la Remolacha.** [Curly top or crimping of Beet.]—Reprinted from *Rev. Asoc. Ing. agrón., Montevideo*, 96, 9 pp., 6 figs., 1955. [English summary. Received June, 1956.]

Beet curly top virus and its vector *Agalliana ensigera* were reported in sugar beet fields in the departments of Canelones, Maldonado, and Colonia, Uruguay [C.M.I. map No. 24], during January, 1954. Other hosts found were chard and spinach.

Winstead (N. N.) & Hebert (T. T.). **A disease of Bean incited by Helminthosporium victoriae.**—*Phytopathology*, 46, 4, pp. 229–231, 1 fig., 1956.

In May, 1954, Tendergreen bean (*Phaseolus vulgaris*) pods of marketable size showing symptoms of a hitherto unreported disease were collected in Pender County, North Carolina. They bore watersoaked lesions about 1 mm. in diameter, with black, necrotic centres, while dark brown to black, narrow streaks, 1 to 5 mm. in length, were also observed on the stems, petioles, and veins. The crop was growing near a field of Victorgrain oats severely infected by *Helminthosporium victoriae*, with which the bean fungus was found to be identical in both its morphological characters and pathogenicity in cross-inoculation experiments. This appears to be the first record of *H. victoriae* on beans, though Meehan and Murphy observed it in a saprophytic or weakly parasitic form on soy-bean [*R.A.M.*, 26, p. 100].

Kilpatrick (R. A.) & Johnson (H. W.). **Purple stain of legume seeds caused by Cercospora species.**—*Phytopathology*, 46, 4, pp. 201–204, 1 fig., 1956.

At the Mississippi Agricultural Experiment Station soy-bean seeds remaining fungus-free for 48 hours on potato dextrose agar plates, containing 50 p.p.m. of the sodium salt of 2,4-D to inhibit germination, were inoculated by placing an agar cube (1 to 2 mm.) bearing mycelium of a *Cercospora* isolate on the testa of each seed. Of 39 isolates from 21 leguminous and non-leguminous (mostly economic) hosts, 35 from 20 induced a pink to purple discoloration similar to that associated with *C. kikuchii* [*R.A.M.*, 35, pp. 65, 576] in the field. Only *C. kikuchii*, however, has been isolated from purple-stained seeds collected out-of-doors.

Isolates of *C. kikuchii* (six), *C. canescens*, *C. stizolobii*, *C. zebrina* (from *Trifolium ambiguum*), *C. penniseti*, and *C. sorghi* also produced a pink to purple seed stain on snap and Lima bean [*Phaseolus vulgaris* and *P. lunatus*], yellow and white lupin, and cowpea.

Using the above-mentioned inoculation technique, discoloration appeared on the testa within 48 hours of inoculation and final readings were made three to four days later.

Nishizawa (T.), Kinoshita (S.), & Yoshii (H.). **On the Soybean blast and its causal fungus Septogloeum sojae n. sp.**—*Ann. phytopath. Soc. Japan*, 20, 1, pp. 11–15, 7 figs., 1955. [Japanese, with English summary. Received 1956.]

A destructive blight of both summer and autumn varieties of soy-bean, observed in Kyushu, Japan, causing superficial brown streaks on leaves (particularly the veins), petioles, stems, and pods, is ascribed to a new species, *Septogloeum sojae*. The 2- to 7-septate spores are 22 to 47 by 3·5 to 5 μ and produced in sporodochia 30 to 100 μ in diameter.

Kefford (R. O.) & Jones (J. R. D.). **Onion seed production.**—*J. Dep. Agric. Vict.*, 54, 7, pp. 297–303, 9 figs., 1956.

In an account of the production of certified onion seed in Victoria attention is drawn to the serious losses caused each season by downy mildew [*Peronospora destructor*: cf. *R.A.M.*, 34, p. 282]. Once present the disease is difficult to control. Preventive spraying at ten to 14 day intervals should be started in October and continue until January. Bordeaux mixture (6:4:40) together with 4 per cent. resin potash soap sticker (15 lb. resin, 1½ lb. potassium hydroxide, 4 gals. water) is recommended. Zineb (2 in 100) with the wetting agent agral LN has shown promise in trials.

Channon (A. G.). **Association of a species of Itersonilia with Parsnip canker in Great Britain.**—*Nature, Lond.*, 178, 4526, p. 217, 1956.

During the winter 1955–6 a number of fungi previously isolated from tissue taken from the inner margins of parsnip canker lesions [*R.A.M.*, 34, p. 696] were tested in the laboratory of the National Vegetable Research Station, Wellesbourne, for pathogenicity to parsnip roots. Of the six cultures tested, only one, subsequently identified as *Itersonilia* sp. (resembling *I. perplexans*) [cf. 35, pp. 352, 826], was able to infect both wounded and unwounded parsnip tissue. Further inoculations with isolates from cankerous lesions in the spring of 1956 resulted in rotting similar to that produced by earlier isolates taken in 1954. *Itersonilia* was isolated from both types of lesions found in the field; in one type dark brown lesions extend 2 to 3 mm. into the shoulder, while in the second the surface of the root ruptures to expose light brown to orange brown parenchymatous tissue. Inoculations produced only the first type of lesion.

The pathogen was obtained from parsnips at Wellesbourne, from two farms in Buckinghamshire, and one in Kent, and is a new record for Great Britain.

Six days after young potted parsnip plants in a greenhouse were sprayed with a mycelial suspension of *Itersonilia* silvery green patches appeared on the leaves, the larger patches having a necrotic centre surrounded by a light green halo. The fungus was reisolated from these lesions.

Komuro (Y.) & Asuyama (H.). **Studies on Cucumber mosaic virus. II. The isolation of the virus from various plants showing mosaic in the vicinity of Tokyo, Japan.**—*Ann. phytopath. Soc. Japan*, 20, 2–3, pp. 77–82, 1955. [Japanese, with English summary. Received 1956.]

In this second contribution [cf. *R.A.M.*, 35, p. 744] it is reported that 35 per cent. of 573 collections of mosaic-diseased plants in the Tokyo area made between 1949 and 1955 yielded cucumber mosaic virus. A further 33 species of plants are listed as previously unreported natural hosts of this virus.

Roland (G.). **Contribution à l'étude du virus de la mosaïque du Concombre (Cucumis virus 1, Doolittle).** [A contribution to the study of Cucumber mosaic virus (*Cucumis* virus 1, Doolittle).] —*Parasitica*, 11, 1, pp. 3–9, 5 figs., 1955.

At the State Phytopathological Station, Gembloux, Belgium, a rabbit anti-

serum of cucumber mosaic virus from cucumber reacted strongly with sap from White Burley and many other tobacco varieties, tomato, and *Nicotiana glutinosa*, all inoculated with the virus from infected dahlias, but only negative results were obtained with infected cucumber or dahlia plants [cf. *R.A.M.*, 31, p. 121] or with healthy tobacco or *N. glutinosa*.

Carborundum transmission experiments with a strain of the virus taken from dahlias and maintained in cucumber [34, p. 206] showed that *Datura stramonium*, *N. glutinosa*, and spinach [32, p. 388] were highly susceptible; beet (Vilmorin forage variety) [loc. cit.] was much less susceptible than spinach, only one of ten inoculated plants developing any symptoms. Potatoes (Ackersegen, Bintje, and Record) and begonias (Gloire châtelaine, Perle rouge, and Carmen) failed to react to inoculation. On White Burley tobacco the virus produced a generalized mosaic with short, whitish, necrotic, sometimes curved lines. Some of the inoculations to tobacco from infected dahlias gave rise to latent infection, the presence of the virus being detected by pre-inoculation with a yellow strain and also serologically.

Sap from naturally infected tobacco plants with chlorotic rings on the leaves found near Gembloux, after it had been ascertained serologically that they did not contain [potato] virus X, produced on tobacco a mosaic or chlorotic rings with fine necrotic lines; *N. glutinosa* plants responded with mosaic and deformation of the leaf blades, the apices of which were twisted.

Cucumber mosaic virus thus produced three different kinds of symptoms on tobacco: mosaic, latent, and ring spot. Though highly susceptible, the response of tobacco is very variable and sometimes nil, being a function, probably, of the strain of the virus present and the cultural conditions in which the infected plants are growing.

Hall (D. H.). **Studies on serology of Cucurbit and Bean viruses.**—*Diss. Abstr.*, 16, 2, p. 219, 1956.

At the University of Wisconsin the successful production of antiserum in rabbits with bean [*Phaseolus vulgaris*] and cucurbit viruses [cf. preceding abstract] was achieved only with bean virus 4 [southern bean mosaic virus] and four viruses of the squash mosaic group. The strains comprising the latter group were shown to be serologically related, with the exception of wild cucumber mosaic virus. The failure of precipitin reactions demonstrated that three melon mosaic viruses and common cucumber mosaic virus were unrelated to either squash mosaic virus or wild cucumber mosaic virus. Similar tests with bean viruses 1 [bean mosaic virus] and 2 [bean yellow mosaic virus] were hampered by the production of non-specific precipitates when concentrated virus preparations or partially cleared crude sap was used as the source of antigen. It is noteworthy that specific antibodies were formed only after injection with viruses relatively stable in their physical properties and it is considered unlikely that specific antisera against the less stable viruses can be produced by standard methods.

Shimomura (T.), Yamaguchi (A.), Uritani (I.), & Hirai (T.). **Resistance of Lotus to the rhizome rot caused by Fusarium bulbigenum Wr. var. nelumbicolum N. et W.**—*Ann. phytopath. Soc. Japan*, 20, 2–3, pp. 47–53, 1 fig., 5 graphs, 1955. [Japanese, with English summary. Received 1956.]

Of five phenolic compounds isolated by paper chromatography from tissue of lotus [*Nelumbo nucifera*] infected by rhizome rot (*Fusarium bulbigenum* var. *nelumbicolum*) in Japan [*R.A.M.*, 33, p. 404], two occurred in smaller amounts in the susceptible variety Usu than in the resistant Shina. Similar quantities of the five occurred in healthy epidermal tissue and in affected tissue. One of the compounds was shown to be chlorogenic acid. Extracts from healthy tissue adjacent to infected contained a thermo-labile substance inhibitory to spores of *F. b.* var.

nelumbicolum. In Shina inorganic phosphorus was lower in tissue adjacent to an infection than in healthy tissue and organic phosphorus higher, while respiration was increased. Dehydrogenase activity was higher in the resistant than in the susceptible variety and increased two days after infection. Phosphatase activity increased 36 to 60 hours after infection in a resistant plant.

Polyakov (I. M.). Новые препараты для искореняющих опрыскиваний. [New preparations for eradication spraying.]—Докл. Акад. сельскохоз. Наук Ленина. [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad agric. Sci.*], **21**, 3, pp. 23–26, 1956.

In an eradication spraying programme carried out in several localities by the Pan-Soviet Scientific Research Institute of Plant Protection, [Leningrad], U.S.S.R., preparations No. 47, No. 125, No. 78, and rodan, applied to the soil early in the spring and followed by Bordeaux mixture sprays, were tested for the control of mildew [*Uncinula necator* and *Plasmopara viticola*] on vine [*R.A.M.*, 35, p. 344]. All the treatments gave effective control, the number of healthy plants being increased from 17·2 (control) to from 37·6 to 63 per cent., and raised yields by up to 30 per cent. on one vine. Preparation No. 125 (composed of nitro-phenolates obtained from shale, produced by the Pan-Soviet Institutes of Plant Protection and Shale Products) is, however, recommended for use against mildews on vine and gooseberry [*Sphaerotheca mors-uvae*: 35, p. 306] and against septoriosis [*Septoria ribis*: cf. 35, p. 689] and anthracnose [*Pseudopeziza ribis*: 34, p. 160] on currants as it is the most economical, dissolves readily in water, and is not harmful to persons handling it. Further experiments showed that it reduces the expenditure of copperas by 40 per cent. and that it may be used effectively in combination with sprays not containing copper, such as fuclasin and dinitrothiocyanatobenzene, thus eliminating the use of Bordeaux mixture. In one experiment No. 125 on the soil reduced vine mildew from 20 (untreated soil) to 13 per cent., and to nil when followed by sprays of 1 per cent. Bordeaux mixture, 2 per cent. fuclasin, or 2 per cent. dinitrothiocyanatobenzene.

Nelson (K. E.). **The effect of Botrytis infection on the tissue of Tokay Grapes.**—*Phytopathology*, **46**, 4, pp. 223–229, 4 figs., 1956.

Conidia of *Botrytis cinerea*, the principal pathogen of Tokay grapes in the Loch area of California [*R.A.M.*, 31, p. 167], suspended in a solution of turnip juice on the surface of intact fruits as described by Brown (*Ann. Bot., Lond.*, 29, pp. 313–348, 1915), germinated and produced in 36 hours at 20° C. a macroscopically visible lesion which after 60 hours attained 1 cm. in diameter, but only 1 to 2 mm. in depth The skin slipped readily from the pulp on the application of pressure. These symptoms were identical with those occurring in the field.

The conidia produce germ-tubes up to 150 μ in length before the formation of an appressorium, from which arises an infection peg, less than 1 μ in diameter, that penetrates the cuticle. The subcuticular mycelium is usually intercellular and largely confined to the outermost five to eight cell layers. The periclinal walls in the three to five outermost cell layers separate more easily than do the anticlinal. The epidermal layer generally remains attached to the cuticle, both being continuous over the lesion.

A water-soluble extract from the medium in which the conidia had germinated induced maceration of the skin tissue of thin grape slices. This enzymatic action was destroyed by five minutes' heating to 100°.

The pectic substances of the intercellular material were denser between the anticlinal than between the periclinal walls. Their disappearance coincided with lesion development and was evidently a result of infection.

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